

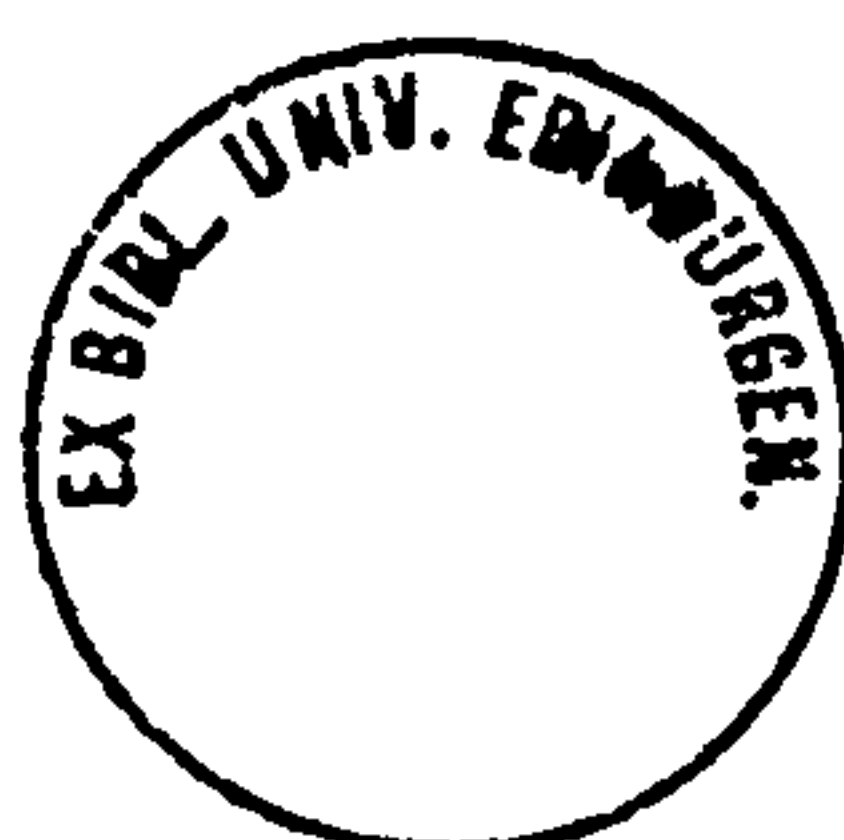
THE RUSSIAN AND SOVIET VIEW OF THE MILITARY-
TECHNICAL CHARACTER OF FUTURE WAR, 1877-2017

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ABSTRACT

The Russian terms '(a) future war' and 'contemporary war(fare)' are sometimes used almost synonymously, sometimes with distinct nuances, the former now equating to 'World War III' in English. They have been used this way since the 1870s, when the volume of analysis of the effect of new technology on warfare increased. The character of future war forms a major part of Military Doctrine, and like Military Doctrine is divided into political and military-technical components. During most of the Soviet period, Doctrine was defined as the state's agreed system of views on the likely course and character of a future war, although it has recently been redefined as a system of views on the prevention of war. It is argued that this does not shift the character of future war from its central position in Doctrine. The Russians produced much analysis of 'future war' before 1914, including the only such work hitherto widely known outside Russia, Bliokh's Future War, which requires a reappraisal. Most of the Russian literature predicted the character of the Great War accurately. Military-scientific works constitute most of the analysis. There were a few fictional treatments of future war, although far fewer than in western languages. Although the demonstrable continuity between Imperial and Soviet writing on the subject transcends the 1917 Revolution, Marxist-Leninist emphasis on prediction reinforced the main stream of military analysis. The quality and quantity of Soviet analysis of the character of future war was particularly marked in the inter-war period, when it preoccupied some of the Soviet Union's most perceptive military thinkers and again foresaw the character of the next great war accurately. After World War II, analysis focused on the 'Revolution in Military Affairs' caused by the ballistic missile and nuclear warhead, the only area of 'future war' thinking hitherto extensively analysed in the west. Since 1945 scientific techniques for forecasting have been more fully developed and there is now an accepted definition of short-, medium- and long-term forecasts, the latter stretching 25 to 30 years ahead and now coinciding with the symbolic 2017 horizon. Throughout the period the General Staff and its associated military academies, which together form a network of future war 'think-tanks' have dominated the view of possible future war. This is now changing with the emergence of some well qualified analysts and respected organs outside the General Staff. The disparity between the highly futuristic views of the General Staff and the requirements of realpolitik appears to be growing. Throughout, concentration has focussed on a great war between major states and political systems. Internal and 'low-intensity' conflict have been neglected, the reasons for which are analysed.

Rule 3.4.3

A small amount of material relating to the relevance of Kuhn's concept of the paradigm to revolutions in military affairs (Part 2, section 7) was also utilised in chapter 2 of the candidate's book, The Evolution of Modern Land Warfare: Theory and Practice, (Routledge, London, 1990), although in a different form and a different overall context. This rule permits previous publication of material with the supervisor's permission and providing it is recorded in the thesis.

RULE 3.4.7

I confirm that this thesis: text, art-work and photographs has been composed and executed entirely by myself, and that it is my own, original work.

(Signed)

C D Bellamy

The cut-off date for source material for this
thesis is 7 June, 1990

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NOTE ON ORTHOGRAPHY AND TRANSLITERATION

The system of transliteration from Soviet Russian used in this study is based on the NATO standard system (STANAG), which is virtually identical to that of the US Board on Geographical Names:

а	a
б	b
в	v
г	g
д	d
е	e(ye) ¹
е (ё)	ë(yë) ²
ж	zh
з	z
и	i
й	y ³
к	k
л	l
м	m
н	n
о	o
п	p
р	r
с	s
т	t
у	u
ф	f
х	kh
ц	ts
ч	ch
ш	sh
щ	shch
ъ	"
ы	y ³
ь	'

э	e
ю	yu
я	ya

1. 'Ye', 'yë' are used at the beginning of a word and when Russian letter 'e' is preceded by another vowel, as in the adjectival ending '-oye', 'Gareyev', 'Leyer'.
2. Russian 'ë' is pronounced 'o' or 'yo', as in Mr Gorbachëv.
3. The adjectival ending 'нѣ', which strict application of this system would render '-yy' is simplified to '-y'. The ending 'нѣ', after '-k-', for example, is rendered in full, as '-iy', as in Tukhachevskiy.

Transliteration of pre-1917 Russian presents special problems. The system adopted is as follows. Where letters used in Tsarist orthography have disappeared but are replaced in modern Russian by letters which existed before 1917 with almost identical values: old ѣ, modern e, old и, modern ю, then the transliteration similarly adopts the replacement letter. The same applies to the pre-Revolutionary use of the hard sign ъ after all concluding consonants that are not soft. As in modern Russian, these are dropped.

Where pre-1917 spelling differs from modern spelling, but using letters still extant: the adjectival plural -ѣ, modern -ие, the adjectival singular -аго, -яго, modern -ого, -ево, then the original spelling is transliterated to preserve an element of the original flavour. Adjectival plural -ѣ is transliterated -ya, rather than -yya. Modern cyrillic ѣ becomes 'yeyë' in transliteration. Before 1917, the form ѣя was used, which is transliterated yeya.

PART ONE. OBJECTIVES, SCOPE AND ORGANIZATION OF THE
THESIS. CLASSIFICATION AND REVIEW OF SOURCES

'Military science is. in essence, the science
of future war'.

Shavrov and Galkin,
Methodology of Military-
Scientific
Understanding, 1977¹

1. REASONS FOR UNDERTAKING THE STUDY

Anyone familiar with the extensive body of Soviet and late Imperial Russian writing on the study of war will have encountered the phrases budushchaya voyna: '(a) future war', and sovremennaya voyna: 'contemporary war(fare)', frequently. The reasoning behind the translation of these terms is explained in part 2, while the range and variety of research materials in which they appear is documented below and throughout this thesis. The terms are prevalent in military-political works, examining the preparation of the state for possible future conflicts in the widest sense; in military-scientific works, analysing the possible shape, appearance, scale and pace of future battles, including the influence of new technology, and in military historical works alluding to the way past views of the character of future wars and warfare affected preparations for wars which then occurred, and the outcome. The personalities most frequently cited as significant contributors to Soviet military thought and the evolution of Soviet military art were all writing about the character of 'future' or 'contemporary' war, and used the phrases frequently, as this study will demonstrate. Frequently, their views were, and are expressed in a graphic and panoramic fashion, and past assessments of the character of future war have been strikingly accurate when compared with conflicts which happened.

Even a preliminary survey of Russian and Soviet writing on the character of future war since the late

1870s reveals a common thread of panoramic scope and foresight which links works widely separated in time and of widely differing character. The reader is reminded of the words of Tolstoy, who was no stranger to the reality of war, and no war-monger, but who described the 'animated, majestic and unexpected' scene as battle unfolded, the erupting smoke giving the whole vast diorama a terrible, bizarre 'beauty'.² Likewise, the First World War Russian poet Valeriy Bryusov described the western front from afar as if it were a giant electrified model, a vision, furthermore, which in 1914 was more a prediction of the future than a description of the present.³ Such an expansive vision is not the exclusive preserve of novelists and poets. In the 1890s, Ivan Bliokh, in his scientific study of future war⁴ foretold 'a great war of entrenchments...the duration of battle, which may be prolonged for several days and which...may yield no decisive results'.⁵ In 1939, with equal prescience, V A Melikov foretold 'the gigantic scale of modern war, in which the most powerful armed coalitions with millions of people and many thousands of armoured vehicles will participate, which may be brought to a victorious conclusion only by the skilful employment of three types of armed forces acting on land, in the air and at sea'.⁶ In 1970, Colonel Sidorenko described the possible nuclear battlefield, with forces fighting 'under conditions involving the presence of vast zones of contamination, destruction, fires and floods'.⁷ All are almost biblical in their apocalyptic scope. Yet this does not mean that the Russians are 'a nation of incorrigible dreamers', as the retired Major-General Sir Alfred Knox (1870-1964), a former Petrograd Military Attaché, claimed in his reaction to the 1935 showing of film of the first large-scale trials of paratroops.⁸ On the contrary, all the examples cited are works of extreme rigour, drawing specific conclusions for equipment, composition and employment of armed forces. The first two also foretold accurately in certain ways the

character of the World Wars which followed them. Sidorenko's prognostication will, it is hoped, remain untested.

It is not possible to demonstrate scientifically whether there is something in the Russian character which induces a particularly far-sighted and expansive view of the character of future war and its implications. Two notable figures in the sphere of predictive fiction have been Russians by birth, but have published or worked abroad, and can in no sense be considered part of the officially approved forecasting process in the USSR itself. These are Yevgeny Zamyatin (1884-1937), whose novel We anticipated and inspired Orwell's Nineteen Eighty-Four and Huxley's Brave New World,⁹ and Isaac Asimov (1920-).¹⁰ However, even a preliminary perusal of officially sanctioned Russian and Soviet works on future war suggests that there is a breadth and prescience about this vision which requires some explanation. This study argues that the scope and coherence of the Russian and Soviet vision of future war, and its combination with an ability to grasp the potential of technology and a willingness to push technology beyond what other nations might consider appropriate or 'safe' limits is the result, at least in part, of a particular methodology and a particular set of priorities.¹¹ The study reveals that there must exist within the Soviet military and associated civilian establishments a mechanism, an intellectual and organizational structure, which not only formulates a view of the character of future war (Soviet pronouncements make this quite obvious), but also translates it into specific requirements for force structures and equipment procurement. This mechanism has its origins in the late Imperial period, but has been reinforced by Marxism Leninism's emphasis on scientific prediction. The activities and interactions of individuals and institutions are cardinal in converting something as

elusive and apparently subjective as a vision of future war into hard and fast policies and requirements.

Naturally, the military-technical character of future war is not a peculiarly Russian and Soviet preoccupation. As General Gareyev explicitly stated recently, developments in military science, the Soviet phrase equating to polemology in its widest sense, are not confined to one nation, but are, in the main, universal,¹² as Clausewitz also realised over a century and a half ago.¹³ However, the present thesis appeared a worthwhile and important project for several reasons. These were: the undoubted significance of Russia and the Soviet Union as a military power in the twentieth century and especially since 1945, notwithstanding the recent internal unrest and imminent Soviet withdrawal from eastern Europe; the huge resources still being invested in equipment and research for a 'future war' by both the Soviet Union and the United States, notably the Strategic Defense Initiative (SDI) and its Soviet equivalent, Kosmicheskaya strategicheskaya oborona (KSO)¹⁴; the enormous amount of intellectual capital which the Russian Empire and the Soviet Union has invested in the study of war; and the highly theoretical and academic character of the Russian and Soviet approach to these matters.

The author's own background as a Russian linguist and graduate, a historian, a student of military history and War Studies, a former soldier and author of books on military science including one entitled The Future of Land Warfare,¹⁵ seemed likely to lend themselves to the study of such an area. Furthermore, as the classification and review of sources demonstrates, this was a tract of largely virgin soil, which needed to be investigated primarily from Russian language sources.

Russian military terminology is extremely precise and specific, and it seemed likely that '(a) future war' and 'contemporary war(fare)' were not merely chance

combinations of words, but represented a defined concept. or concepts. How these concepts, if such they were, fitted in to the well-known and established intellectual framework of military science, military doctrine and military art, and to other areas of science and philosophy such as the theory of scientific revolutions and systems theory, was clearly a valid intellectual exercise. This is the subject of part two of this thesis. The evolution of Russian and Soviet ideas about future war was inextricably linked with Russian and Soviet military thought: indeed, those ideas were its very essence. The effect of these ideas on political, industrial and military organization, equipment procurement and the outcome of military operations, made this an important and largely neglected aspect of military history. So was analysis of the institutional structure by which the view of the character of future war was conceived, validated and disseminated, a process which this thesis demonstrates to have been centred on the organization of the General Staff. The latter analysis is best conducted as part of a chronological account, taking note of changes in events, organization and personalities. Part three thus addresses these questions in such a context. Finally, current Soviet views on future war(fare) had obvious and growing relevance to current defence policy, arms control, and predicting how the Soviet Union was likely to behave and how its armed forces were likely to evolve. During the course of writing this thesis, these questions acquired greater prominence and uncertainty with the rapidly changing world political situation, the implications of which are addressed. This is the subject of part four.

2. STRUCTURE OF THE THESIS

The structure of this thesis is therefore as follows.

Part one sets out the reasons for undertaking the study and its objectives, its structure, the methodology and

classifies the wide range of materials and sources used.

Part two sets out the theoretical basis. It deals with the emergence of the idea of the future and the origins of forecasting and planning. It explains the terminology and translation problems, and the place of 'future war' in the intellectual framework of Soviet military science, doctrine and art. It then attempts to examine how much revolutions in military affairs have in common with other revolutions in science, and concludes with an account of how Soviet forecasts are classified: 'short term', 'long-term', and so on.

Part three is the historical database, from the late 1870s to the postwar period. This falls naturally into five sections: the nineteenth century revolution in military affairs and the road to World War I; the assimilation of armour and the aircraft and the road to World War II; War at Sea; War in the Air; the 'Revolution in Military Affairs' brought about by the ballistic missile and the nuclear weapon and its interaction with conventional options up to the 1970s. The last section is dealt with briefly as, unlike other periods, it has been accorded adequate attention by western analysts and to retrace their steps would not constitute an original contribution to knowledge. Brezhnev's Tula speech of 1977¹⁶ provides a convenient point to conclude this part, and to begin analysis of current developments, which have their origins in the 1970s.

Part four deals with current thinking about 'future war' and, by definition therefore, with the future. After establishing where exactly the 'current' view of future war began to gell, this part examines the recent re-definition of military doctrine; the institutional mechanism by which the view of future war is formulated and disseminated; with the new technologies which the Russians believe will provide the basis for the continuing 'Revolution in Military Affairs'; with the growing

significance of the oceans and space; and, most important, the gaps and anomalies. The principal gap is the apparent lack of any effort to examine internal and 'low intensity' warfare, the type in which the Soviet Armed Forces and Internal Security troops are most likely to be involved.

Thus, the thesis endeavours to form a prognoz,¹⁷ a prognosis for the future based on a valid methodology, known facts and historical data. The structure comprising an introductory 'road map' followed by three large parts dealing with the theoretical framework, the historical database and the future, each subdivided into sections is more appropriate than division into a number of shorter chapters.

3. TIME-FRAME INVESTIGATED

The period reviewed in this thesis covers approximately 140 years, of which 27 years lie in the future. The first 40 years are the era of the Russian Empire ('Russian'), the remaining years to date are 'Soviet', and the political complexion of the future is uncertain. This choice requires explanation.

The historical perspective used by Russian and Soviet analysts is exceptionally broad and long, and to arrive at a valid appreciation of the concept, this study must use a similar perspective. As the Arab Historian Ibn Khaldun noted in the fourteenth century, 'the past resembles the future as water resembles water'.¹⁸ Raymond Garthoff, introducing his 1959 translation of General Pokrovskiy's prescient works on science, technology and contemporary war, warned his readers not to be surprised when Pokrovskiy began by detailing the Carthaginians' technological superiority over the Romans in the ancient world.¹⁹ General Kuropatkin, Russian War Minister from 1900 to 1904, presented the Tsar with his plan for the Russian Empire's strategy for the twentieth century in 1900. He used as his database a detailed study of all the

wars fought by the Russians during the previous two centuries (1700 to 1900). The expansiveness and coherence of the plan was not lost on the British translator. 'The forethought and care with which the possible price of Empire in the twentieth century was worked out by the Russian War Ministry is enlightening, for who has estimated the probable cost in blood and treasure of the expansion or maintenance of the British Empire during the next hundred years?'²⁰

A long historical perspective is therefore mandatory, and reaps dividends. Current Soviet exploration of conventional operations, preferably without nuclear weapons, arguably has more in common with the dilemmas of the future war thinkers of the 1930s than it does with those of the early decades of the nuclear age. Kuropatkin's recommendation that Russia should exploit her defensive strength and not be diverted to aggressive enterprises, reiterated by Svechin in the 1920s,²¹ is recalled in the modern doctrine of 'defensive sufficiency',²¹ and Soviet endeavours to develop their own form of 'Strategic Defence Initiative'.²² The validity of comparisons over a relatively long historical timespan is ensured by the remarkable consistency and continuity in terminology and thought processes throughout the period under review. Over four to five generations, between the end of the 1870s and now, Russian and Soviet methodology and terminology have retained many consistent characteristics. That is so, in spite of massive political upheaval and the ravages of war which, with the Civil War and World War II have seared almost all of Soviet territory. It has remained so in spite of enforced migrations and systematic attempts by foreign and indigenous dictators to exterminate large sections of society. This can only reinforce the conclusion that Russian and Soviet approaches to the problem of 'future war' possess an extraordinary vitality and resilience.

The necessity for a long historical perspective is reinforced by the recent political, social and associated military changes in eastern Europe and the Soviet Union. The former changes are the most radical since 1945: the latter, the most radical since 1917 and, with the possible emergence of a form of democracy, recall the events of 1905-14. There can be no doubt that present changes have cut right through the Soviet neo-cortex, stretching back to 1917, and that valid precedents exist from the late Imperial period. If we are seeking firm ground in order to identify historical precedents, it is necessary to examine the layer below. The modern system of universal military service dates from 1874: that of military districts from Milyutin's reforms of the 1860s.²³ This places the emergence of the terms '(a) future war' and 'contemporary war(fare)' in the right historical context.

The term 'future wars' appears, in French, in a letter from the renowned military thinker General Jomini to the reforming Russian War Minister Dmitriy Milyutin of 18(30) September, 1866. A copy of the manuscript draft of this letter is included as Appendix A. Jomini's Précis de l'Art de la Guerre had been dedicated to the Russian Tsar,²⁴ and Jomini conducted a lively correspondence with Milyutin and Tsar Aleksandr II during the 1860s.

'J'ai reçula lettre que Votre Excellence a bien voulu m'adresser en réponse à celle que je lui avais écrité au Sujet des changements que les Chemins de fer opéreront sur les futures guerres et Surtout dans les guerres défensives'.²⁵

During the 1870s the military journal Voyenny sbornik featured a number of increasingly scientific articles on issues related to 'future war', including war games²⁶ and whether strategy was a science or an art²⁷, but the first use of the terms '(a) future war' and 'contemporary war(fare)' in their modern relationship encountered by the author appears in 1877. The author of the article, one of the 'N.Z.', cannot, unfortunately, be identified, but the

subject was 'The tasks of cavalry in contemporary wars'.²⁸
On line 7, immediately below, the author asserted that

'in future wars, without doubt, we will encounter
the use of cavalry for reconnaissance and
security of armies', as used by the Germans
in the late Franco-German war of 1870-71'.²⁹

Although the terms 'contemporary wars'³⁰, 'contemporary military operations'³¹ and 'the character of contemporary combat'³² had all been used in military-scientific writing during the 1870s, this was the first juxtaposition of 'future' and 'contemporary' wars and warfare in a modern way. Part 2 of the thesis demonstrates that this use of the terms as virtual synonyms has continued almost to the present day. The linguistic continuity back to 1877, combined with the outbreak of the Russo-Turkish War in that year and the general profusion of military-scientific writing from the mid-1870s, makes 1877 a convenient starting date for detailed consideration of the issues.

This choice of starting date makes possible detailed consideration of the accelerating revolution in armaments from the 1880s onwards. During the 1890s there was a further surge of writing on the influence of new technology on tactics. Writing on the influence of demographic changes, in particular the 'mass' or 'million-strong' army, the practical problems of deploying it and the effect this might have on military art continued in parallel.³³ In addition, the 1890s were formative years for officers, some of whom would go on to shape the development of Soviet military thinking after 1917.³⁴

Although drawing on an earlier ten-year background of research and writing in the field of Russian and Soviet military studies, this thesis was the specific product of the years 1987 to 1990. As parts 2 and 4 demonstrate, recent and current Soviet long-term forecasts look some 25 to 30 and even 35 years ahead. The year 2017 clearly has some symbolic significance for Soviet planners as the centenary of the Russian Revolution. As part 4 also

demonstrates, it has some specific importance in the Soviet space programme. Although political changes may lessen the significance of the Revolution's centenary, its choice is consistent with past Soviet practice, which tends to emphasize anniversaries, five and ten year periods. Therefore, 2017 has been selected as a major and significant landmark on the horizon. More generally, a horizon some 30 years ahead appears sensible, given the time-span of Soviet forecasts analysed in part 2.

4. ACADEMIC DISCIPLINES TO WHICH THIS STUDY BELONGS

This thesis was completed in the Centre for Defence Studies, University of Edinburgh, under the ultimate auspices of the Faculty of Social Sciences. 'Defence Studies' is widely acknowledged to be a multi-disciplinary field. Nevertheless, just as Clausewitz opined that war was one of the social sciences³⁵, so too, it appears, are Defence Studies. A work in the field of 'Defence Studies' corresponds to the Soviet field of 'military science'. However, no British or US university awards the degree of Doktor voyennykh nauk: 'Doctor of Military Sciences', introduced in the Soviet Union in 1937.³⁶ The main disciplines at the author's disposal are Modern History and Modern Languages and Literature. Given the volume of source material which has had to be analysed, a fluent and swift reading command of Russian has been a sine qua non, without which it would not have been possible to begin.

Much of this thesis is inevitably historical, because the Russians themselves place great emphasis on history as one of the tools for predicting the future. As the authors of a book on the Evolution of Military Art³⁷ concluded, in 1988,

'military art, in the process of its development, has trodden a road of many centuries, - from the most simple, primitive forms and methods of using armed forces to those, which are declared, or are used in practice in contemporary wars [sovremennye voyny here seem to be wars that are happening, not possible wars of the near future]. It is important

to clarify that this process did not unfold in a chaotic fashion not in a disordered way. Its study and deep reflection permit one to identify firm laws and trends in military art and constantly recall them while constructing forecasts of its further development...Although modern conventional weapons have moved far ahead in effectiveness, range and destructiveness, the parameters for their use remain, all the same, within the confine of rational bounds. Wars employing conventional weapons, local wars, unfortunately, became widespread after the Second World War. Such wars are now taking place in a number of areas of the world. Therefore, the process of establishing the trends and laws of military art is unfinished. The [historical] analysis which has been conducted only serves as a step in its turn along this road.³⁸

Historians have tended to think that their territory stopped 'at the knife edge of "now"'.³⁹ Historians can, however, play an important role in predicting the future, and clearly do so in the Soviet Union. The long lead times for weapons and equipment development, and the long periods that these items remain in service, make the study of fairly recent history, and the ideas which in turn shaped that history when it lay in the future, of direct relevance to predicting tomorrow.

The study also lies within the field of futures studies. The history of past attempts to predict the future is a recognized subset of futures studies, as are methods of prediction. Futures, the Journal of Forecasting and Prediction, has provided useful guidelines for approaching the material from the viewpoint of this relatively new discipline.⁴⁰

This study also inevitably reflects the Russians' own emphasis on the hard sciences, and particular disciplines which will affect the character of future war, as well as methods of prediction. What the Russians mean by cybernetics, mathematical modelling, the use of queueing theory⁴¹ and fluid dynamics in predicting the course of battles, all need to be addressed, as well as individual

weapons technologies. Studies of the influence of new technology on forms of combat appear side by side with more specifically technological articles on new systems themselves. A group of sources of particular interest are articles on 'cruise missiles' (inspired by the German V-1s) and ballistic missiles (V-2s), beginning with Pokrovskiy in 1944, combining observation of foreign developments with a long-standing Russian interest in super long range artillery.⁴²

Whilst a reasonable understanding of science and technology are critical to the present thesis, it is not a thesis in physics or mathematics. The author has attempted to explain the functioning of new generation weapons, for example electro-magnetic guns, the constraints of orbital physics, or issues which arise in the mathematical modelling of conflict, in terms which indicate that he possesses such an understanding and which should be comprehensible to the intelligent layman.

Like warfare itself, this thesis is therefore part 'art', part 'science'. The study of the future and the study of the past have proved inextricable. The history of science has provided useful parallels, as argued in part 2. However, a knowledge of institutional and human interaction, and of military sociology and institutions, based on common sense and experience, is perhaps the most important tool, apart from command of the Russian language, in a work of this kind, and one which is often lacking. A prime example is the extensive work of Ivan Bliokh (Bloch), which reached its final form in his study Future War... published in 1898.⁴³ As demonstrated in part 3, many commentators have taken Bliokh's work in isolation, taken the passages outside their proper institutional and personal context. Why did a Warsaw banker, with no military experience, compile a magnum opus on future war? As demonstrated, Bliokh came to the subject, in part because he was involved in municipal

planning for the city of Warsaw, which would most likely be at the centre of any future major European war involving the Russian Empire. Contrary to popular belief, Bliokh was not an 'amateur' who managed to get it right when all the professional soldiers got it wrong: his study of professional military literature and debt to his professional consultants are clearly and explicitly stated. Another example is the tendency to associate ideas and articles too closely and personally with the senior officer whose name appears at the bottom. Senior Soviet officers have their juniors drafting for them as much as their British and American equivalents, with implications discussed in the review of sources below.

Lastly, this is in part a study of the Russian language itself. The study was in part inspired by the prevalence of a particular phrase in Russian: budushchaya voyna. The problem with the precise nuances of budushchaya voyna and sovremennaya voyna has been alluded to already, and is examined in part 2. So are the nuances of prognozirovaniye (forecasting) and predvideniye (foresight), and the absence in Russian of definite and indefinite articles. Psycholinguistic differences must always be borne in mind, and reaching a valid translation of terms fundamental to the study is an academic exercise in itself. The author has found his formal study of scientific and technical translation and of translation theory a particular asset in completing this work.⁴⁴ In the beginning was the word. However, this is emphatically not a 'content analysis'. It would no doubt have been possible to take the database of works recorded in the bibliography and analyse them to establish the frequency of budushchaya voyna, sovremennaya voyna, and the number of times they appeared in the same article. As part 2, 3 and 4 demonstrate, the terms appear to have different meanings in different contexts. In the author's view, a 'content analysis' would not have been very useful. It is

hoped that a sensitive, descriptive analysis of the Russian and Soviet view of future war will be.

5. CLASSIFICATION AND REVIEW OF SOURCES

The latest editions of the Soviet Military Encyclopedia (the relevant volume of which was published in 1976)⁴⁵ and the Military Encyclopedic Dictionary (1983-86)⁴⁶ do not include specific entries on 'future war'. The reasons for this are discussed in part 2. However, the earlier edition of the Soviet Military Encyclopedia, the relevant volume of which was published in 1933, does.⁴⁷ A useful model of the methodology necessary to investigate the Russian and Soviet view of future war can be derived from the 1933 article:

'Views on this [future war] do not always find definitive official expression. More often, they are expressed in the form of official remarks in regulations, orders, training courses and the pronouncements of authorities on military affairs. However, there were quite a few specialised works on the theme of future war, particularly before the World War of 1914 to 1918. At the moment [1933], there exists in bourgeois states a whole future war literature, comprising both theoretical works and semi-literary creative writings'.⁴⁸

The Soviet view of future war can be investigated from a similar spectrum of sources. In the earlier period covered by this study, these views are recorded in written, largely printed records, but in the case of the recent and current view of future war the spoken testimonial of senior Soviet officers and analysts is of unique value. During the period of study the principle of glasnost gathered momentum and unprecedented discussions between NATO and Warsaw Pact on military doctrine and deployments took place. Interviews with Soviet authorities who visited Britain and through academic and professional colleagues who visited the USSR have provided unique confirmation of some published sources, and cast doubt on the value of some analysis of others.

Of particular value were private records of discussions

between US Army and Soviet General Staff Representatives in September, 1989,⁴⁹ the testimonial of the author's colleague John Hines, visiting Moscow in December, 1989 (particularly discussions with Generals Larionov, Chaldymov and Dr Tsygichko),⁵⁰ and a record of the CSBM negotiations in Vienna, January 1990.⁵¹ In the first case the author was involved in briefing the US delegation and in the first two cases, provided specific questions addressed to the Soviet representatives. Their responses can therefore be considered as responses to the author's own, specific enquiries with regard to this thesis. Other important and unique interviews were those with Dr Sergey Karaganov in December 1989, and with a Soviet student of artificial intelligence in October, 1989.⁵² The long record of contacts between Edinburgh University's Defence Studies Centre and the Soviet military and academic establishment was of obvious value, notably in the form of the December 1988 Edinburgh Conversations⁵³ and insights culled from visiting Soviet academics.

The author was able to interview one Soviet defector, a former Main Intelligence Directorate (GRU) officer, using the pseudonym Viktor Suvorov. Although sceptical about some of Suvorov's work, the author has full confidence in his answers to particular questions about Soviet semantics and attitudes.⁵⁴ ✓

Last, and most privileged, were the author's first hand encounters with senior Soviet officers in the Soviet Union, in May, 1990. Remarks by Chief of the General Staff Army General Mikhail Moiseyev and Deputy Chief of the Airborne Forces Lieutenant General Vladislav Lebedev were instructive, and a private interview with Deputy Minister for Armaments Army General Vitaliy Shabanov answered particular questions. During this visit a researcher at the Lenin Military political Academy specialising in Chinese affairs was also interviewed.⁵⁵

These contacts have helped verify or dispute conclusions from published evidence. When dealing with the Soviet view of future war, it is not sufficient simply to catalogue quotations from printed journals and analyse Soviet texts in a theological fashion. For example, the excellent work of Mary Fitzgerald, which has not addressed 'future war' as such but deals with some related current issues, appears to rely entirely on analysis of published speeches and documents. There has been a tendency to identify the beginning of the 'all-conventional' option with Brezhnev's Tula speech of 1977.⁵⁶ Yet how is this to be reconciled with continuing lavish Soviet investment in strategic and battlefield nuclear systems? It appears that the General Staff continued to attempt to make the nuclear model work up to about 1985, and that there is frequently a ten year delay between the General Staff fully espousing political directives on the one hand, and between their recommendations being fully accepted by the political leadership on the other.⁵⁷

Another issue which those who rely entirely on printed sources miss is the exact origin of ideas and their development within the General Staff. The author's experience in the British Ministry of Defence has inclined him to the view that senior officers spend the first part of their careers obeying their superiors, and then at some point begin taking most orders from their subordinates, certainly in terms of what they write. Fitzgerald's article 'Marshal Ogarkov and the new Revolution in Soviet Military Affairs' suggests that Ogarkov was personally responsible for all the ideas expressed above his signature about future warfare and such memorable phrases as 'weapons employing new physical principles'.⁵⁸ In discussions with the Soviet Major-General Kirshin, it emerged that Marshal Ogarkov had 'signed a lot' (podpisal), as opposed to 'written a lot' (pisal).⁵⁹ According to this source, much of the work originated with the shadowy

figure of Colonel-General Danilevich, about whom little is known. General Gareyev, on the other hand, former head of the Military Science Directorate, identified in part 4 as being at the centre of 'future war' thinking, apparently writes all his material himself.

The historical component of the thesis naturally relies almost entirely on written sources. Few archival materials are available: even in the days of glasnost, Soviet War, Naval and Defence Ministry internal documents relating to war planning and operational requirements are not available to the public. The Soviet General Staff is certainly unlikely to allow access to postwar documents relating to planning for future war.

Jomini's 1866 correspondence with Milyutin is a rare example of an archival(manuscript) source providing information unavailable in other media.⁶⁰ A particularly valuable archival source on the late Imperial period are the archives of the French Service Historique de l'Armée de Terre at Vincennes, which contain the voluminous correspondence of French military representatives posted to Russia during the period of the Franco-Russian alliance from 1894. It is here that we are reminded that Russian military thinking did not evolve in isolation, and encounter the first reference to the General Staff Academy as a 'think tank', in 1910. It was the War Minister's intention

'd'arriver ainsi a l'equité de doctrines
et de faire de plus en plus de l'academie
un centre pensant de l'armée Russe'.⁶¹

It is perhaps ironic that the first references to 'a future war' and to the General Staff Academy as a 'think tank' encountered in this study, although both referring to Russia, are in French.

The fact that most of the materials used are not hand- or typewritten in their final form in no way detracts from their status as primary sources or the originality of this

work. The printing press still occupies the position in the Soviet Union which has been increasingly usurped by the word-processor and photocopying machine in the West. The Soviet Army and Navy effectively print most of their training manuals. In addition, a large volume of archival documentation and conference proceedings has been recorded in print. Obruchev's comments on the plans for war with Turkey in the 1870s are an example of the subsequent printing of what originated as a highly sensitive internal document,⁶² as are the large chunks of Kuropatkin's 1900 and 1901 reports to the Tsar which were subsequently published.⁶³

References to unpublished archival documents are also sometimes found. For example, an article in Voyenno-istoricheskii zhurnal on 'The Birth and Development of Soviet Military Doctrine', contains many references to future war and records that in the 1920s a collective led by Tukhachevskiy compiled 'a theoretical work called "Future War" (Budushchaya voyna)'. This does not appear to have been published as such, although sections of it may have found their way into many articles, and is cited as being in the Central State Military History Archive (TsGASA).⁶⁴ The author's attempts to gain access to this material through the editor of the Soviet Military Historical Journal were, regrettably, unsuccessful. However, as this thesis was practically complete, the newly established Soviet archive service, run by the firm MITEK, indicated in response to the author's enquiries that they had traced the documents, which they said ran to some 700 pages.⁶⁵

However, enough information was available during the period of study to confirm the author's conclusions about the process of forming the 'in-house' view of the character of future war. The 1920s study team also comprised Ya. M. Zhigur, A. N. Nikonov and Ya. K. Berzin.⁶⁶ Zhigur was an expert on chemical warfare, while Berzin

(1889-1938) was at the time a member of the Red Army intelligence directorate.⁶⁷ Berzin would therefore have been well qualified to advise on developments in foreign armies: the 'threat' side of the analysis. Given the emphasis on chemical warfare, attested by sources as diverse as the foreign observer General Werner von Blomberg⁶⁸ and Bulgakov's fictional short story The Fatal Eggs,⁶⁹ Zhigur's inclusion is logical. Nikonov was one of the authors of the 1933 Soviet Military Encyclopedia article on future war, attesting to a significant period of association with the 'future war' problem in general.⁷⁰ Tukhachevskiy, as an experienced operational commander, political idealist and military-technical visionary was the obvious person to head the study. Thus, this second hand report of an archival source tells us much about both the view of future war at the time and the methodology by which it was formulated.

A primary, official and originally unpublished source which had just become available at the time of writing comprised lectures delivered at the Voroshilov Academy of the General Staff of the USSR Armed Forces. The lectures concerned were delivered between 1973 and 1975, and were communicated to the west by two Afghan officers. A US Government and Army team undertook their translation and publication.⁷¹ These provided 'information on Soviet military theory and practice that in authority, scope and level of detail has been unavailable previously'.⁷² Of particular relevance to the concept of 'future war' was one entitled 'Principles and Content of Military Strategy' delivered to the entire student body, not just foreign students, in 1973 by Lieutenant General Shavrov, one of the principal authors of the cardinal work The Methodology of Military-Scientific Cognition.⁷³ This lecture therefore underscored the interrelationship between Military Science, Doctrine and Art on the one hand and methods of prediction (particularly of the character of

future war) on the other. The lecture did not present anything dramatically new or different about 'future war' and its relationship to Military Science, Doctrine and Art but rather provided highly authoritative confirmation of definitions and categorizations published in a range of open sources.⁷⁴

The main problem with sources, however, is not their scarcity but their bulk and profusion. Turning to printed books and articles alluding to views of future war, all of which must be considered primary sources, the volume of material is overwhelming. Few sources examine the concept of future war as such: Golubev's M V Frunze on the character of Future War (1931)⁷⁵ and the 1933 Soviet Military Encyclopedia article are the most obvious, and acquire the status of key primary sources by their very rarity. However, evidence of Soviet views of future war from a given time is copious. There is a Russian and Soviet tradition of debate in the open military press, which continues to the present day, which means that highly abstruse questions of military theory and policy have been and are discussed in journals available on public subscription, and in books which can be purchased or are available in the world's major reference libraries. A feel for the range of published articles and books can be gained from the 1936 bibliography of Russian language sources dealing with the lessons of World War I for 'future war', which contains some 1650 entries.⁷⁶

The excellent international inter-library loan system ensured that every Russian work identified as being of interest and held in the Lenin State Library was available to the author far more efficiently than would have been the case had he needed to spend months, possibly years, in Moscow. The Lenin library has proved surprisingly willing to lend its original treasures, with some remarkable results. The copy of one important source, Martynov's Strategy in the Age of Napoleon and in our Time (1894),

sent through the system bore the book plate of General Kuropatkin, War Minister from 1898 to 1904 and commander-in-chief in Manchuria, complete with what appear to be his marginal notes. A copy of some relevant pages is included as Annex B.⁷⁷

Other works have only been available as blurred copies of microfilm, for example the copy of Svechin's Strategy, and were therefore not always easy to read, with some passages illegible.⁷⁸ The tendency of Soviet works to self-destruct after a few decades, because of highly acidic paper, also poses some problems. The fact that the Soviet Union did not become party to the copyright convention until 1973 has proved helpful, as there are no copyright restrictions on reproducing all but the last 17 years' material, but conversely older books and articles may be too fragile to copy and must be transcribed by hand. In this regard, Tsarist works have, in the main, lasted far better, being printed on far superior paper. This compensates for the fact that Tsarist orthography is different from modern Russian and requires some acclimatisation (see the note on transliteration at the beginning of the thesis).

Published articles and books on 'future war' (and, sometimes, 'contemporary war') as seen from the time when they were written are fairly frequently encountered from the 1890s onwards, and there is a vast number of articles from the 1920s and 30s.⁷⁹ The principal Imperial Russian journals Voyenny Sbornik (Military Review) (VSb) (founded 1858) and Morskoy Sbornik (Naval Review) (MSb) (founded 1848) form a massive fund of material, amounting to a thick volume every two months. In the Soviet period there were many journals, including Voyenny Vestnik (Military Herald) (VV)⁸⁰; the collection Voyennaya nauka i revolyutsiya (Military Science and the Revolution) (VNiR)⁸¹; the journal Revolyutsiya i voyna (Revolution and War) (RiV) (later Voyna i revolyutsiya) (ViR)⁸²; Voyennaya

Mysl' i Revolyutsiya (Military Thought and the Revolution) (VMiR); Krasnaya armiya (Red Army)(KA), Mobilizatsionny sbornik (Mobilisation Review) and Voyennoye delo (Military Affairs) and the newspaper Krasnaya zvezda (Red Star)(KZ).⁸³ Where articles were unavailable in the UK, they were obtained either from the United States (RiV/ViR) or the Soviet Union itself (RiV/ViR and VMiR), in the case of the latter graciously marked 'dar'-'gift'.⁸⁴

Of particular importance is Voyennaya mysl' - Military Thought(VM). Military Thought has traditionally been a journal 'for Generals and Admirals only', analogous to a 'restricted' journal in the west.⁸⁵ However, most issues up to and including the 1960s and a large cross-section of later issues have been available to the author. From 1989 VM became available on public subscription. The author's first copies thus appeared only as the present work was nearing completion, but the decision to make VM available also appears to have induced a more open attitude with regard to the release of articles from previously 'restricted' issues. In addition, the 1989 series of revolutions in eastern Europe appears to have led a number of state libraries of the Soviet Union's former allies to release their copies of VM.⁸⁶ Traditionally, Military Thought's articles carried slightly greater weight than those in other journals, and in the period before World war II, certainly, they sometimes evince a more scholarly and detached approach. It remains to be seen whether abandonment of the 'Generals and Admirals only' rubric will lead to a diminution of VM's value as a highly authoritative and candid source.

In the post war period the ubiquitous Military Historical Journal (Voyenno-istoricheskiy zhurnal)(VIZh)(founded in 1939 but discontinued from 1941-59) and Communist of the Armed Forces(Kommunist Vooruzhënnnykh Sil)(KVS)(from 1960) are added to the swell of source material.⁸⁷ In recent years VIZh has emerged

from its former sober salmon pink livery to feature fewer articles on military doctrine and art (see part 2), and more pictures and published archival materials. It may be that the coverage of the old VIZh, which contained many valuable articles relevant to this study, will be undertaken by the newly available VM.

Communist of the Armed Forces (KVS) is particularly illuminating as articles on 'Contemporary War' are specifically and explicitly aimed at those in charge of political education, indicating that the 'character of future war' is not merely an abstraction for high level planning and procurement decisions, but is a concept communicated directly to the lowest levels of the Soviet military establishment: to ordinary soldiers, sailors and airmen. A 1962 article entitled 'The Character and Peculiarities of Contemporary War[fare]' revealed that this subject should be studied as part of 'political education', by extended service soldiers and sailors in groups for a total of six hours and by sergeants and starshiny (above senior sergeants but below praporshchiki or warrant officers) for eight hours. The course began with the Marxist-Leninist concept of war, then explored the ruling of the XXII Party Congress on the influence of modern weaponry on the character of war, and finally, particular problems of military operations in conditions where weapons of mass destruction (nuclear and chemical) were used.⁸⁸ An article with the same title in 1969 revealed that most students had eight hours allocated for this subject, of which two should be devoted to lectures, two to private study and four to group seminars. The first part of the course was the same, the second 'Character of wars of the modern epoch', and the third special features of the military action of sub-units and units in modern warfare, and the role of men and machines. This is fairly conclusive evidence that the 'character of modern warfare', which, as part 2 demonstrates, is often

virtually synonymous with the character of future war, is a clearly defined subject for study down to all but the very lowest level (the conscript) in the Soviet Armed Forces.⁸⁹

Over the last three decades, VM, MSb, VIZh, KVS and KZ have been the most serious and reputable Soviet military journals and newspaper dealing with matters covered by this study. Insights can sometimes also be gained from the Aerospace journal Aviatsiya i Kosmonavtika and Tekhnika i Vooruzheniya (Technology and Armament).⁹⁰ However, the more lightweight international journal Soviet Military Review, now discontinued, should not be dismissed. Recently, it contained the unique revelation that Soviet troops on exercise had used weapons based on particle accelerators.⁹¹

All these journals dealt with the Soviet Armed Forces and their preparation for major inter-state conflict. There has been remarkably little discussion of possible 'low intensity' or guerrilla warfare, or of internal conflict. The reasons for this are discussed in part 4. When a military thinker comments on these issues, for example, Tukhachevskiy writing about 'Fighting against counter-revolutionary insurrections',⁹² or Tsiffer, about 'War in Undeveloped Regions',⁹³ it is of particular interest.

Therefore, the unprecedented availability from 1990 of the Interior Ministry (MVD) journal Sovetskaya militsiya (Soviet police), may be just as significant as the unprecedented availability of VM.⁹⁴ After decades of focussing on the preparation of the Soviet Armed Forces for a future major interstate war, western analysts must now be acutely aware that the type of warfare in which the Soviet Union is most likely to be involved is 'low intensity', and possibly internal conflict. The MVD has its own large armed organization, quite distinct from the Armed Forces (Strategic Missile Forces, Army, Air Forces,

Air Defence Forces, Navy), and internal warfare is constitutionally their concern, and that of the KGB. The MVD journal and the KGB Border Guards' journal Pogranichnik may become forums for discussion of such operations, although there has also been limited discussion of the Armed Forces' internal role in the Armed Forces' journals (see part 4).

In recent years certain journals other than those traditionally concerned with military science have become regular sources of discussion of military policy and science. The journal of World Economics and International Affairs (MEMO) is published by the Institute of that name which, along with the Institute of the USA and Canada, has been a home for non-General Staff analysts (see part 4). This has been a forum for discussion of future operational forms designed to conform to the stated policy of 'defensive sufficiency'.⁹⁵ The journal International Affairs published in English and Russian, has also featured significant articles.⁹⁶

A number of key articles by senior figures have appeared in the Communist Party journal Kommunist.⁹⁷ Finally, the literary journal Znamya (Standard) recently featured a seminal article on 'Foresight' by Andrey Kokoshin and Army general V N Lobov, with Aleksandr Svechin's views on the character of (a) future war in their modern context as its core.⁹⁸ The appearance of 'the character of future war' at the centre of an article on foresight, the reevaluation of Svechin in the modern context, and the issues of attack and defence made this a pivotal article for the key words and issues addressed in sections 2, 3 and 4 of this thesis. But it appeared in a literary journal, not a military-scientific one, further underlining the need for a synoptic and eclectic approach highlighted throughout this thesis. Therefore, a copy of the Russian original is included as Appendix E.

In addition to specialized military journals, service

newspapers, and the journals of other, 'civilian' institutes involved, the national press also sometimes features serious articles on military scientific themes and lessons from past and continuing conflict. The pre-Revolutionary quality daily Russian Gazette,⁹⁹ Pravda¹⁰⁰ and Izvestiya¹⁰¹ have all yielded some important source material. Once again, less apparently weighty sources should not be ignored. The humble Soviet Weekly provided the only confirmation that the bright red berets seen in film from Azerbaijan in early 1990 were the insignia of a specialist unit of MVD counter-terrorist advisers, a significant innovation with regard to the Soviet Union's view of the future warfare in which it might be engaged.¹⁰²

Russian and other East European analyses of Military Doctrine, Science and Art form a large category of sources, and these areas of study, as noted, can frequently be regarded as synonymous with 'future war'.¹⁰³ As noted already, only one military encyclopedia, that of 1933 (of which only two volumes were published) contains direct reference to future war. However, military and other encyclopedias as a class of literature are considered by Russian and Soviet professionals to be important indicators of the general level of military scientific endeavour.¹⁰⁴ Insights into the structure of Soviet military scientific thinking and thus thinking about future war are apparent from Leyer's Encyclopedia of Military and Naval Sciences (1883-97)¹⁰⁵, the 1976-80 Soviet Military Encyclopedia and the Military Encyclopaedic Dictionaries of 1983 and 1986,¹⁰⁶ and entries in the various editions of the Great Soviet Encyclopedia.¹⁰⁷

There are also some large published collections of military writing: articles, chapters and condensed sections of books. These are of exceptional value and are replete with constant reference to the problem of future

war and contain useful commentary and biographical information. Examples are , for the pre-World War I period, Russian Military and Theoretical Thought of the 19th and early 20th Centuries (1960),¹⁰⁸ for the inter-war period Questions of Strategy and Operational art in Soviet Military Works, 1917-1940(1965)¹⁰⁹ and Tukhachevskiy's Collected Works(1964);¹¹⁰ and, for the post war era, Problems of the Revolution in Military Affairs (1965)¹¹¹.

Histories of military organization frequently contain references to prevailing views of 'future war', for example The Soviet Armed Forces: A History of their Organization (1978)¹¹², or the books by Losik¹¹³ and Anan'ev¹¹⁴ on tank forces.

Published Russian and Soviet documents on war planning and strategic deployment are an important source. In the case of General Obruchev's comments on the strategic plan for a war against Turkey, they can reveal an astonishingly dynamic and futuristic view of future war.¹¹⁵ Questions of strategic deployment, often based on the experience of World War I, are particularly important in the period leading up to June, 1941.¹¹⁶

Speeches by Soviet military and political leaders alluding to the character of future war are usually more general than pieces written as books or articles, but are an important source on prevailing doctrine. Speeches by Tukhachevskiy¹¹⁷, Stalin,¹¹⁸ Zhukov,¹¹⁹ Brezhnev,¹²⁰ Gorbachëv,¹²¹ and Chief of the General Staff Moiseyev¹²² all mark certain milestones in the evolution of the concept of future war.

Russian and Soviet Field Service Regulations (PU) yield implicit and explicit clues about the prevailing concept of future war. The earlier Field Service Regulations (the Tsarist PU-12 and the Soviet PU-18 are documents covering highly detailed questions of organization and deployment. The latter reflected World War I lessons, and was

therefore conditioned by positional war experience while retaining part one on 'Manoeuvre War'.¹²³ The later Soviet Field Service Regulations are works of broader scope. A comparison of PU-29 and the far sighted PU-36, the latter owing much to the work of Tukhachevskiy, is especially instructive.¹²⁴ The projected PU-41 is illuminating with regard to the shifts in views of the character of future operations in the immediate pre-war years.¹²⁵ Efforts were made during the time of writing to obtain Soviet post-war PUs, believed to include some from the 1950s and PU-1964, but these were not available.¹²⁶ In all cases, general (combined arms) Field Service Regulations were followed by special to arm regulations later.¹²⁷ However, works such as Sokolovskiy's Strategy and Reznichenko's Taktika¹²⁸ can be considered almost as unclassified versions of the current regulations. A detailed analysis of the changes between Reznichenko's 1966, 1984 and 1987 editions of Taktika can yield a great deal that must duplicate a comparison of corresponding Field Service Regulations, and tell us much the same about views on the character of future war. For example, the 1987 Taktika, besides being much larger (496 pp. as against 270 for the 1984 edition and 408 for the 1966), places far more stress on high technology and high precision weapons, suppression of enemy air defence, combat with helicopters and features a conclusion (there was none in the 1984 edition) stressing new methods of troop control (involving automation and computers), 'very advanced technology', and changed combat support measures which in many cases have become part of actual combat (electronic warfare, for example).¹²⁹

At this stage the reader may begin to feel that Russian and Soviet thinking about the character of future war is and has been overwhelmingly concerned with land or, since the 1920s, air-land operations. Since 1945, this type of large scale, 'continental' warfare has extended

into space and embraced the strategic nuclear balance. The Navy has, it is true, been something of a Cinderella service in Russia and the Soviet Union, but, paradoxically, the relatively low standing of the Russian and Soviet navies may have forced certain naval officers to think more imaginatively and radically about the future of their service. The naval journal Morskoy Sbornik covers a range of subjects unequalled in any of the land forces' journals, from the broadest strategic questions (embracing sea and land) to specific technological ones. Considering the state of the Soviet Navy in 1922, the editors were acutely conscious of being the poor relation of the army:

'In former [pre-revolutionary] times, Russia was poor in literary and scientific expertise among naval specialists, and the many years of war and revolution right up to the most recent times have further weakened it. The Navy has found itself to be many times weaker than the Army in this regard. At the disposal of the RSFSR [the Soviet Union had not yet been formed] there are 1500 members of the old General Staff, among whom many are military-scientific authors [nauchno-literaturnye rabotniki]; in the Red Army there already exists a numerous cadre of young command personnel, including some dozens of young General Staff officers. In the Navy the number of former [ex-Tsarist] command personnel is a few hundred and people with a higher naval staff training are numbered in single figures. Young Red commanders in the Navy are practically non-existent.'¹³⁰

Nevertheless, predicting future war on, over and under the sea, is a subject of at least equivalent magnitude to continental operations. This is an area where technological changes have had and may continue to have a more immediate and critical impact, than on land. It includes certain very interesting works, for example, Gorshkov's Sea Power of the State, undoubtedly one of the most expansive and formidable postwar Soviet books within the 'future war' category.¹³¹ Works about the Navy may be of great, even superior value in divining Soviet thinking

about future war generally. Immediately before World War I, Morskoy Sbornik featured major articles by three important figures in the general evolution of Soviet military thinking. The first was the prolific and eminent V Novitskiy, editor of the indispensable 1911-15 Military Encyclopedia, writing on 'The Theory of Mobilisation' (1910).¹³² The second was N Klado, author of 'Studies on Strategy' (1913-14), and the third the prominent land forces' theorist A Neznamov, who crossed pens with Klado over the views of the German theorist Schlichting.¹³³ After the war, in 1922, another important thinker, V Zherve, used Morskoy Sbornik to set out a logical framework within which naval plans and programmes could be formulated, beginning with a 'general plan of preparation of the state for war', leading to 'plans for war with probable opponents', and thence to strategic missions for the Armed Forces and partial strategic missions for component parts of the Armed Forces (e.g., the Navy)¹³⁴

Returning to the very recent past, the last book prefaced by Fleet Admiral Gorshkov, published at the time of his death in 1988 provides an outstanding example of how a book apparently about the Navy may illuminate Soviet views on future warfare in general and the way these views are formulated. This remarkable volume is called The Navy: its Role and Perspectives for Development and Employment. The other authors comprised a historian, a tactician and an expert on operational research and scientific prediction: a compact profile of the Soviet methodology for determining the character of future war.¹³⁵ The book is most illuminating with regard to general Soviet methodology. Although noting the peculiarities of (osobennosti) of naval development, for example, the 1988 book provides a concentrated treatment of forecasting in general, its interaction with technological change, and the role of war games. This work is considered in detail in part 4. Captain Skugarëv, one

of the authors of the book, also wrote one of the most enlightening articles on planning and prediction in the context of armed forces' development, which appeared in the naval journal Morskoy Sbornik, in 1972.¹³⁶

A Naval General Staff (as opposed to the naval main staff which dealt with detailed questions of personnel and sea training) was set up in 1911 to oversee naval intelligence and statistics, war plans, and mobilisation for war in the three main theatres: the Baltic and Black Seas and Pacific Ocean. It was linked to the Nicholas Naval Academy, and thus replicated the structure and functions of the older land forces' General Staff in preparing for 'a future war' in conjunction with the appropriate Military Academy.¹³⁷ The latter played the central role in formulating the likely 'character' of that war. A work such as The Problem of the Pacific in the Twentieth Century, (1922) by the emigré Russian General N Golovin, is not at first sight 'Soviet', but it tells us much about the methodology which Golovin was trained to use, and which those who remained in Soviet service continued to use: the combination of geographical, demographic and political trends, and analysis of opposing forces, leading to a prediction of a naval war between Japan and the Anglo-Saxon powers in the Pacific.¹³⁸ Although this analysis was addressed at a specifically naval question, the methodology used also had much in common with that employed in preparing for future war on land. The same problem was addressed almost simultaneously on the Soviet side of the wire by B Dolivo-Dobrovol'skiy, (a widely published future war thinker) in The Pacific Problem (1924).¹³⁹ This is similarly illuminating with regard to methodology and sources, utilising 'modern strategic monographs', then histories of past conflicts in the area, then analysis of modern naval technology and organization. Once again, Japan was the likely aggressor, and the author correctly forecast that

she could seize the Philippines 'with virtual impunity'.¹⁴⁰

Nowadays, given the ranges of modern weapons systems, the importance of the sea in the context of space-based war (if only because it occupies over two thirds of the surface of the planet), and the integrated nature of the modern Soviet Theatre Strategic Operation¹⁴¹, it is arguably no longer possible to consider warfare on and over land and warfare on, over and under the sea as separate categories.

Memoirs of military and political figures frequently provide clues to the processes of forecasting and planning. Sources as diverse as Shtemenko's The General Staff in the War Years(1968) and the memoirs of Maisky, the Soviet ambassador in London, are instructive.¹⁴² Maisky, for example, recalled how in 1936 Tukhachevskiy and the British Director of Military operations and Intelligence, General Dill, used their knowledge of military history in a fascinating discussion of the possible effect of paratroops if they had been available in past battles, and the lessons that could be drawn for the future.¹⁴³

This completes the survey of Russian military-theoretical and semi-official works. A separate category identified by the 1933 Military Encyclopedia article comprises semi-literary (polubelletricheskiye) writings', or fiction. The general subject of future war fiction was addressed by I F Clarke in Voices Prophesying War(1966), an interesting title as the book concentrates on fiction and ignores military-theoretical works almost completely.¹⁴⁴ Clarke did not address Russian future war fiction, either, and therefore the present author's research in this area also breaks new ground.

The scientific and technological revolution which created the idea that future conflict might be fundamentally different in nature and appearance from wars

gone by (see part 2) also stimulated an explosion of science fiction.¹⁴⁵ The division between science fiction and serious predictions of, and planning for, future conflict is far from clear cut. 'Science fiction is military history, and in war, science fiction comes to life'.¹⁴⁶ The German authority who made this statement saw nothing incongruous about describing Count von Schlieffen's vision of a giant Cannae, a 'super-Sedan' alongside fictional works by Edward George Earle Bulwer-Lytton (1803-73) or those of H G Wells. This is not so surprising as it may seem at first sight. Both the latter authors, writing before World War I, forecast the advent of the Atom bomb.¹⁴⁷ When it finally came, the Great War was in many ways science fiction incarnate with its aeroplanes, airships and submarines recalling the works of Jules Verne. Imagination, even mysticism, has often preceded scientific discovery and technological innovation. Man's age old urge to fly is perhaps the most obvious example of this. The fiction of the Czech Carel Kapek and of Isaac Asimov provided a serious impetus to the development of robotics, and who can say with certainty that the development of laser damage and charged particle beam weapons owes nothing to a desire to emulate the 'death ray' of science fiction comics.¹⁴⁸

By and large, Russian science fiction is rather pacific compared with that of the west. Tsiolkovskiy's remarkable stories of space travel, beginning with Free Space (1883) and continuing almost until his death in 1935, are distinguished by a noble vision of the peaceful conquest of space. He discusses the use of gunpowder and bullets in space, but only to illustrate basic scientific principles and not, apparently, with any view to their lethal employment.¹⁴⁹

The most brilliant members of the futurist movement did not contribute directly to the formulation of serious plans and policies for future war, either. Velemir Khlebnikov did allow his wild imagination to run riot in a

mystical and eschatological work, The Battles of 1915-17, A New Study of War, published in 1915. In this he propounded the theory that battles, and analogous results, would be repeated every so many years.¹⁵⁰

There is however some evidence of fiction in Russia being used to influence official policy or thinking in the way that, for example, General Hackett's book The Third World War, published in 1978, was undoubtedly intended to apply pressure for an increase in western conventional armaments.¹⁵¹ This is to be expected as the Russian nineteenth century literary tradition had employed the novel as a means of raising current political issues when open discussion of political questions was forbidden. Not only was Chernyshevskiy's What is to be done?¹⁵² an important discussion of current social problems, but Chernyshevskiy was actually one of the first editors of Voyenny sbornik,¹⁵³ and was a great supporter of the naval journal, Morskoy sbornik.¹⁵⁴

In the late 1880s two fictional Russian works about future war at sea appeared which were clearly intended to influence Russian official policy. One was Vice Admiral A Belomor's The Fatal War of 18?? (published 1889), translated into German as 'The Future War of 18?? (1897).¹⁵⁵ The other was The Cruiser 'Russian Hope', (1887). The English translation of the latter assessed, no doubt correctly, that it was 'written with the manifest purpose of stimulating the Czar's government to strengthen the Imperial Navy'.¹⁵⁶ These predictions of future war at sea are described in part 3.

It does still seem suprising that after 1917 possible future wars do not feature anywhere near as prominently in Soviet fiction as they do in that of western languages. Only two examples have emerged, although both are remarkable and written by major literary figures. The first is the description of the Red Army moving to do battle with mutant reptiles in Bulgakov's The Fatal Eggs,

written in 1924 and set in the close future of 1928.¹⁵⁷ The other is Aleksey Tolstoy's The Garin Hyperboloid [Death Ray] (1926-27), a remarkable prediction of a laser weapon.¹⁵⁸ These are described in part 3. They do not appear to have been written with the aim of influencing official policy, although Bulgakov's description of 'future warfare' seen from 1924 was highly accurate and prophetic.

Fiction can still, however, illuminate areas where other sources fail: for example, Elena Sergeyevna Venttsel's story At the Tests,¹⁵⁹ published in the literary journal Novy mir (New World) in 1967, indicates when and how cybernetics began to be assimilated into military research.

The works of Marx, Engels and Lenin occupy a special place in Soviet bibliographies. In the context of this study they play two roles; as indicators of views of the character of future war at the time, and because they are frequently cited in Soviet works both on military doctrine and on questions of forecasting and prediction.¹⁶⁰ Engels' views on the military technical character of future war seen from the mid to late nineteenth century viewpoint are of obvious interest, and frequently of chilling accuracy.¹⁶¹ Marx, unlike Engels (who seems to have been interested in military matters for their own sake), was principally interested in future war as a catalyst for revolution, but both he and Lenin had much to say on scientific prediction.¹⁶² The work of Marx, Engels and Lenin thus forms a special category.

The second group of primary sources are Russian, Soviet and other East European works on the question of forecasting and prediction itself. This has its intellectual origins in the pre- and early Soviet periods in the work of A A Bogdanov (1873-1928)¹⁶³ and K A Timiryazev (1843-1920).¹⁶⁴ Bogdanov made significant contributions in the fields of medicine, politics,

philosophy and literature, and he wrote two works of science fiction, one of which, Red Star (1908) is replete with suggested innovations, underlining the link between science fiction and scientific forecasting.¹⁶⁵ Bogdanov suggested that political, social, economic, scientific and technological evolution all shared similar characteristics, leading to an integrated science of control, which he called 'tectology' and which is now known (in the west) as cybernetics: the study of systems.¹⁶⁶ The relation of Bogdanov's work to the concept of future war is further examined in part 2. Timiryazev was similarly eclectic, making his main contribution in the field of biology.¹⁶⁷ The evolution of Soviet forecasting owes much to the biological sciences. In this context it is worth noting that V V Kuibishev, who strove to improve the performance of the bureaucracy in both day to day management and long term planning after the Civil War, had studied at the Academy of Military medicine¹⁶⁸, and that Asimov is also a biologist. One of Russia's greatest scientists, D A Mendeleev, who devised the periodic table of the elements, was also aware of the theoretical basis of predictive techniques.¹⁶⁹ Indeed, the periodic table, which enabled scientists to predict the possibility of new elements which did not exist in nature, forms a vivid model of predictive techniques, laying down a set of rules derived from observations which can then be extrapolated to predict occurrences which have not been, and cannot yet be, observed.

During the Stalinist period, the study of forecasting as a science was neglected, in part because of the Stalinist personality cult, and in part because of the prevailing doctrine of determinism: the future was what the Soviet people - or its leader - chose to make it.¹⁷⁰ After Stalin's death, in 1953, a more scientific appraisal of the effect of new weaponry on the character of future war (the 'Revolution in Military Affairs')¹⁷¹ was

accompanied by more scientific examination of the techniques of prediction themselves. Literature on forecasting in military affairs becomes more plentiful during the 1960s,¹⁷² and by the late 1960s influential commentators were stressing the need for military strategy to 'generalize and analyze the laws and tendencies of the development of technology'¹⁷³, and 'to foresee possible changes in the methods of conducting armed struggle and to spot new phenomena in time'.¹⁷⁴ As noted, a number of works on techniques of forecasting themselves appeared at the turn of the 1960s and early 1970s, by Bestuzhev-Lada, Skugarëv and Konoplëv.¹⁷⁵

The 1960s and 70s therefore witnessed the formalisation of predictive techniques, although intelligent commentators had applied similar methods instinctively for decades.

A separate body of literature relates to Soviet work on automated control systems (ASU), of particular importance to the Soviet view of future warfare today. This range of specialised material is catalogued in part 4, section 1.

This completes the survey of Russian and Soviet materials. The next category to be considered must be materials from the the Russian Empire's former possession of Poland and the Soviet Union's (former)Warsaw Pact Allies. If it would be premature to recognise the complete disintegration of the Warsaw Pact, the events of late 1989 suggested that it was no longer a viable military alliance capable of conducting a major war in future, and in May 1990 the Defence Ministers of the Atlantic Alliance formally recognised that it had ceased to present a 'unified threat'.¹⁷⁶

As the Warsaw Pact fragments, the Soviet Union's former allies are each likely to pursue their own defence policies, and indigenous style in military affairs, already evident before 1989, may assert itself even more

strongly. However, during the period 1945-89 the Soviet Union exercised strong influence on the military structure and planning of its allies and, conversely, their military literature reflected Soviet ideas. Polish materials, in particular, have proved valuable sources. Polish sources have played a prominent part in divining some aspects of recent Soviet Military Doctrine, notably the employment of Operational Manoeuvre Groups (OMGs) in any future war.¹⁷⁷

The Poles have a superb tradition of writing about military science, stretching back to the 1920s and 30s and the Polish military journal Bellona, and strong links with French military thinking. In the period 1945-89 Polish works were often less cluttered with ideological jargon than Soviet ones, and were often more forthcoming. However, it would be wrong to think that Polish sources were in other respects merely reflections of Soviet thinking and methodology. The Polish Military-Historical Journal, Wojskowy Przegląd Historyczny, has included articles on 'The Progressive Traditions of Polish Arms' (1966)¹⁷⁸, on the Evolution of Military Doctrine (1970),¹⁷⁹ Operational Art (1971),¹⁸⁰ and on Strategy (1972),¹⁸¹ which besides their own striking originality all draw on a mixture of western, particularly French, and Soviet sources. The definition of Strategy is remarkably eclectic, drawing on the views of a range of foreign authorities and not at all a reflection of the rigid Soviet definition (see part 2).¹⁸² A 1974 article on the Polish General Staff Academy contained a detailed representation of its contacts with Soviet and Polish military and civilian institutions, providing a partial model of the future war think-tank process which the author has not found in Soviet sources.¹⁸³

The observations of foreign military observers and other foreign intelligence sources, preserved in the official documents of Britain,¹⁸⁴ and the United States¹⁸⁵ contain useful insights. These can be compared with

Soviet sources, and the comparison may provide invaluable confirmation of both. For example, Pokrovskiy's vision of a rocket barrage (to compensate for inaccuracy) illustrated in a popular magazine in 1944 is borne out by secret US Air Intelligence Reports from 1948.¹⁸⁶ There can be few more vivid illustrations of the scope and radical content of the Soviet view of future war in the mid 1930s than the reactions of Major-General Alfred Knox to the showing of the first film of a massed parachute assault¹⁸⁷, or the comments of Colonel Giffard Martel, himself a 'future war' thinker of some note, on the 1936 Belorussian manoeuvres.¹⁸⁸ More minute and detailed are the reports of foreign military attachés, which help to fill in the picture with regard to the way detailed war and mobilisation plans reflected views of future war.¹⁸⁹

Turning to 'secondary' studies of the Soviet view of future war in western languages, only two have been identified. Both are primarily translations of Soviet articles with some editorial comment, and both deal with a limited timeframe - that of the 'Revolution in Military affairs', when Soviet statements on the new, or evolving paradigm of future war were fairly hard to ignore.

Raymond Garthoff's The Soviet Image of Future War (1959)¹⁹⁰ centres exclusively on the Revolution in Military affairs of the 1950s, and of its 137 pages, 42 are a direct translation of three Soviet works, two of them specifically addressing Military science. Although Garthoff's work is a useful pointer to various original source, it cannot be regarded as a work addressing the concept of future war generally, or in any great depth. Its source base is almost entirely articles published in the 1950s exploring the impact of ballistic missiles and nuclear weaponry on Military Doctrine, science and art. It thus addresses one narrow slice of the area covered by this study. Even if that were not the case, enough has been written in the Soviet Union alone in the last thirty

years, to justify a re-examination. Garthoff does however remark, as anyone investigating the subject must, on the remarkably sophisticated Soviet mechanism for analysing the character of future war and the vast sweep of their historical perspective, exemplified by Pokrovskiy's work. Almost contemporary with this, Arnold Horelick's Some Soviet Views on the Nature of a Future War and the Factors Determining its Course and Outcome (1958)¹⁹¹, is a collection of translated articles rather than an analysis.

The only other work in a western language which overlaps with the present study is Dr Jacob Kipp's study From Foresight to Forecasting: the Russian and Soviet Experience.¹⁹² This study has a broad, eclectic source base utilising, for example, creative literature, in a similar way to the present study. It also parallels the present study in beginning, absolutely rightly, with the Tsarist intellectual tradition. Dr Kipp's study concentrates more on the science of forecasting itself, rather than what has specifically been predicted regarding the character of future war. In particular, Dr Kipp's study chooses not to examine the impact of new technology on the conduct and character of war in detail. Therefore, this study and that of Dr Kipp are complementary.

One of the most thorough recent compilations defining areas of military science and terminology is Julian Lider's volume in the Swedish Studies in International relations series, Military Theory: Concept Structure, Problems (1983). This is an exhaustive analysis of western and Soviet approaches including chapters on Marxist-Leninist teaching on war and the army (chapter three), Soviet Military Science (six) and Doctrine(nine).¹⁹³ These draw extensively on Soviet books and periodicals. Lider does not list 'future war' as a separate and identifiable concept although the term naturally occurs often, especially as a component of Doctrine. Lider correctly defines Military Doctrine as 'an



expression of the scientifically based views officially adopted in a state concerning the political assessment of a future war', citing a conference on Soviet Military Doctrine in 1963.¹⁹⁴ Furthermore, he provides a simple but essentially accurate outline of the mechanism by which the image of future war is formulated and used. In the process of elaborating and defining Doctrine, the State's leaders

'proceed from an evaluation of the political objectives, the economic, techno-scientific and military potentials of the Soviet Union and its probable adversary. The evaluation includes an assessment of the social structure of both societies and, in this connection, of the possibilities of mobilizing resources for war. A comprehensive assessment of the character of future war, i.e., of its social and political essence, probable methods of waging war and the appropriate measures which need to be taken to prepare the country and its armed forces for it, are made on the basis of the conclusions and recommendations selected and presented by military science. It is the latter which ought to examine all possible means, methods and forms of conducting a future war taking into account the socio-political and techno-military development and to present to the leadership various ways of solving military tasks in future wars.'¹⁹⁵

From here, it would be a logical step to examine 'future war' as a component of Military Doctrine, Military Science and Military Art, but it is not a step which Lider takes. His compendious work is, however, a most useful secondary source.

Another of Raymond Garthoff's books, How Russia Makes War (1954)¹⁹⁶ does not specifically examine 'future war', either. It is divided into three sections: the relationship between Soviet Military Doctrine and Soviet political Doctrine, ; a distillation of the (then) current Soviet principles of war; and a more detailed examination of operational art and tactics. The book is however a useful study of soviet military thought in its entirety and contains useful pointers to the existence of a methodology for creating and utilising a concept of future

war, for example the establishment of a 'Bureau for the Study of Modern war' in 1949 (a fact which tests the assertion that under Stalin all discussion of the effect of the Revolution in Military Affairs was stifled).¹⁹⁷

A number of other books in English have touched on 'future war' in general investigations of Soviet military thought, though tangentially and briefly. Harriet and William Scott are unusual among western commentators in indexing 'future war' as a distinct subject in The Armed Forces of the USSR,¹⁹⁸ and their translation of Sokolovskiy's Military Strategy.¹⁹⁹ This reflects the authors' awareness of the prevalence of the term in Russian works. Thus, they allude to Marshal Malinovskiy's account of Khrushchev's speech to the 20th Party Congress in 1960, in which Malinovskiy mentions '...the nature of modern war...in a future war the decisive place will belong to the nuclear rocket weapon...a future world war...the beginning period of a possible war...'²⁰⁰ Similarly, the Scotts report Nekrich's account in June 22, 1941, in which he refers to the Soviet war plan of 1941 and the 'insufficient elaboration of the character and contents of the initial period of the war...', and to the views of Tukhachevskiy and others on future war in the 1930s.²⁰¹ However, the Scotts do not discuss the concept of future war as a component of Military Doctrine and Science, nor its expected character except in the very broadest terms: that Tukhachevskiy and Uborevich expected it to be 'mobile', or the view prevalent between the 1950s and 1970s that the next war would be a nuclear rocket war.²⁰²

Peter Vigor's The Soviet View of War, Peace and Neutrality²⁰³ specifically eschews questions of strategy, operational art and tactics, concentrating on the Soviet classifications of wars and the objectives for which they might be waged. The words 'future war' occasionally crop up, as for example when he mentions Engels' views,²⁰⁴ but

the character of future war is not addressed specifically. Towards the end of the book Vigor mentions Soviet views on the influence of technology on war, and Soviet thinking for nuclear war, concluding with the then recent (1975) emergence of a non-nuclear option.²⁰⁵

The collection of articles edited by Derek Leebaert under the title Soviet Military Thinking (1981)²⁰⁶ contains some useful allusions to future war. It also acts as a warning against mirror imaging, which is a serious problem with western analysts' work. We have to try to see the concept of future war in Soviet terms and not interpret Soviet comments, procedures and structures as reflections of our own. In particular, western civilian analysts often assume that the same conflict between 'military' and 'civilian' interests exists in the Soviet Union as in the west. Most recently, they interpret the appearance of civilian analysts of military affairs under Mr Gorbachev as an automatic blow to the military, and welcome it because it appears to place people like them in analogous positions in the Soviet Union's Military Doctrine forming process.²⁰⁷ Leebaert, for example, says that 'there is a need to go beyond either accepting Soviet military writings as blueprints of procedures and expectations, or dismissing them as not representative of civilian thinking'.²⁰⁸ The idea that something which is 'not representative of civilian thinking' is to be 'dismissed' reflects western analysts' conditioning to think in terms of an inevitable contradiction between civilian and military requirements.

The process for formulating and utilising the vision of future war in Russia and the Soviet Union has, the author believes, been characterized by considerable cooperation between strictly professional military and less directly military interests. We need only think of Tukhachevskiy's arguments in favour of tanks and aircraft, that they were almost identical to the products of

'civilian' aircraft and tractor industries, and would therefore be less of a drain on the economy than the 'artillery armies' of the past.²⁰⁹ Leebaert comes close to outlining the methodology and structure for establishing and utilising the character of future war, listing some of the cliches and preconceptions which need to be examined. Among the latter he mentions 'the military's institutional chauvinism, bureaucratic inefficiency, lags in the Russian learning curve about the implications of new weaponry...'²¹⁰ Whilst there is some truth in the first two, even a cursory examination of Soviet work on future war suggests that to talk about 'lags in the Russian learning curve about the implications of new weaponry' is well wide of the mark. Leebaert, like Lider, does suggest a plausible model for the formulation of the concept of future war,

'Soviet views on war and deterrence are a product of continuous refinement by theoreticians in the senior service academies, the main political administration of the armed forces, and the main operations directorate of the General Staff. The military-technical side of doctrine is affected by lead times and refinements in weapon systems, as well as by a broad reading of the view of the probable enemy... Final approval by the party leadership follows the Defence Ministry's integration into finished doctrine of the criteria for peacetime weapon acquisition and wartime force employment'.²¹¹

The description of 'theoreticians' in the senior service academies working on questions of 'deterrence' has a decidedly western ring. The Soviet Union has recently publicly moved to greater emphasis on war prevention (which, as argued in parts 2 and 4 is not the same as deterrence), as opposed to preparation for war.²¹² However, most of those working on such questions in the USSR have been military men, with practical military experience and technical qualifications. General Pokrovskiy, a soldier, engineer and nuclear physicist with a strong sense of history, embodies the unique combination

of skills and expertise required to formulate and utilise a view of the character of future war. In this area Pokrovskiy was undoubtedly convinced that the Soviet system created what Napoleon called, in a different context, a 'superior understanding'.²¹³ As this thesis neared completion, however, a group of analysts not directly subordinate to the General Staff was emerging and beginning to make a serious contribution (see part 4).

Some of the most useful work in English deals with the interaction between Military Doctrine and weapons procurement, the sociology of science and technology, and to what extent Doctrine drives technology and vice versa. David Holloway's contribution in this area has been outstanding. Holloway has challenged the simplistic view that whereas in the west industry and technology drive weapons development and then doctrine procurement, in the Soviet Union this process is reversed. Holloway has said that the relationship is one of complex interdependence, and has pointed out, for example, that Soviet writings stress how technological change forces changes in military Doctrine and Military Art, not the other way round.²¹⁴ Other useful work on the sociology of science and technology includes, for example, the effect of missile guidance technology on nuclear strategy.²¹⁵ However, the 'military technical character' of future war embraces its scope, shape and pace, operational art and tactics and not purely technological influences.

The literature in western languages, primarily English, relating to the subject of this thesis is thus very fragmented. This is quite natural when we consider that no western nation today has anything corresponding to Soviet Military Doctrine. Nor has any western nation a clearly defined and laid out scheme establishing the exact relation between Military Science, Military Doctrine and Military Art into which 'future war' can be inserted, as has been possible in part 2 of this study. The coherence

of the Soviet view, which sees military, diplomatic, economic and cultural policies as interrelated parts of a whole, has no parallel in modern western society. The fragmentary and random distribution of western literature reflects this.

Because of the prominence of the two world wars, and the impetus to study the circumstances which led up to the and strategic planning, Soviet and western historical writing does contain insights into Russian and Soviet views of future war. Rostunov's Russian Front in the First World War contains a substantial (55 page) chapter on Russian strategic planning, for example.²¹⁶ Turning to western secondary sources, Dominic Lieven's Russia and the Origins of the First World War²¹⁷ drew the author's attention to the remarkable and far sighted views of P N Durnovo, the Minister of the Interior who predicted, first, that a major war would be a long and bitter struggle and secondly, the strain that this would place on Russian society.²¹⁸

Some theses have also proved useful secondary sources, especially on Soviet war industry and preparation for total war²¹⁹, strategic planning,²²⁰ and even possible 'future war' scenarios, though not from a Soviet viewpoint.²²¹

No examination of the Soviet view of future war would be complete without serious and substantial comparison with the way other great powers have addressed the question. One may at first be surprised at the energy with which the Soviet Union analysed the lessons of World War I and drew lessons for the future, compared with the rather half hearted British response which eventually resulted in the Kirke Report.²²² Some British thinkers, like the armoured pioneer Sir Percy Hobart, writing to Liddell Hart in 1937, expressed the need for such an approach. 'I can never get anyone to paint any sort of definite picture of what the battle area might look like (in their opinion) in

the next war'.²²³ Liddell Hart recommended the creation of a future war 'think tank' which, although he almost certainly did not know it at the time, bears a striking resemblance to what existed and, as this thesis demonstrates, still exists in the USSR.

'The War Office has organs for research into weapons etc., but not into the conditions of future warfare ... There are no means for the comprehensive analysis of past experience, and thus no synthesis of adequately expressed data to serve as a guide in framing policy... At present the investigation of problems is pushed on to officers who are occupied with current military business. That task ought to be given to a body of officers who can devote their whole time to exploring the data on record collecting it from outside, and working out the conclusions in a free atmosphere. Such a body should be composed of the best intellects in the Army, with a good blend of practical experience, and in selecting them particular attention should be given to originality of thought or critical powers. It is desirable that they should be supplemented by a permanent nucleus consisting of some first-rate university men who have been trained in scientific enquiry'.²²⁴

Had Liddell Hart gone to the Soviet Union, had he been admitted to the Frunze and, later, the Voroshilov Academy of the General Staff, he would have found a body very much as he described here, although 'current military business' would always interfere to some extent. The university training in scientific enquiry is provided, in part, by senior Soviet officers' possessing higher degrees in Military Science, which have no real parallel in Britain or even the United States.

One of the most original and incisive thinkers on 'future war' in the west was a Czech by birth, Ferdinand Otto Miksche.²²⁵ Miksche's writing has some of that un-western quality: that ability to combine military detail with abstraction and intellectualisation, which is noticeable in Soviet military writing. It has been argued that the Russian/Soviet and Prussian/German armies are part of a common north-east European military

tradition.²²⁶ There are striking similarities between the approach of Russian/Soviet and Prussian/German analysts to establishing the character of future war, reinforced by the relatively recent sharing of experience and expertise in the 1920s. Miksche, writing on Paratroops in 1943, cited the German manual of Troop Leadership:

'War undergoes a constant evolution. New weapons create new forms of combat. To foresee this technical evolution accurately, to assess the effect of a new weapon on the course of battle and to employ it before the enemy does are essential conditions of success'.²²⁷

It may be more than coincidence that this German statement has a distinctively Soviet 'ring' to it. As Miksche was aware, there is a distinctively 'central', or is it east, European 'style' in these matters:

'English[sic.] and American readers must bear with me if they do not find the book 100 per cent English in the mode of its expression. For the continental outlook I need not apologize, since this ought to be a definite gain. Myself a middle European, I was brought up to the idea that military matters are in their nature dry and must be treated in a strictly scientific way. This the Germans have done, and in much that I have to say I shall be showing how... we have a lot to learn from the enemy'.²²⁸

This question of 'style' is an important one in examining the Russian and Soviet view of the military-technical character of future war. It is something which transcends the 1917 Revolutions. Some readers may express surprise that the 140-year timespan of this thesis bridges the Revolutionary gulf. Aside from the fact that there are good reasons for so doing, explained in part 1.2, the author is convinced that the change in Government of 1917 did not immediately and universally change everybody's way of doing business. In the long term, it was obviously more dramatic and far reaching than a change of government from Conservative to Labour might be in Britain or Republican to Democrat in the United States. But there is a wealth of evidence that professional men, including the military,

carried on their work in the way they had before the Revolution.

Bogdanov's work on Tectology first appeared in 1912: the gap in time and experience between then and the third edition in 1922 was not so great.²²⁹ The continuity is illustrated most vividly in the Naval journal, Morskoy Sbornik. It was not until June, 1919 that the editors changed the cover from one illustrating the Tsarist St Andrew's Cross naval ensign to a plain printed cover,²³⁰ and in February 1920 the edition for the last quarter of 1919 recorded its debt to the important Imperial Russian military and naval theorist Nikolay Klado, who died on 10 July. His views on the future aims and character of the journal, expressed during the last three to four months of his life, in early 1919, well after the Bolshevik Revolution, were duly printed,²³¹ and the next reappraisal, expressing a debt to Klado, was published in 1922.²³² No wonder that editions of the 1930s counted the Soviet MSb's foundation date as 1848, and that that remains true today: a continuous tradition over more than 140 years. In methods of expression and analysis, and the subject of the latter, and its unbroken run of publication, MSb represents complete continuity.

Another example was apparent from the copy of the 1921 edition of Neznamov's Contemporary War, from the Lenin State Library, consulted by the author. Published by the Higher Military Publishing Soviet, and complete with the exhortation to the world's workers to unite, the book bore the General Staff Library stamp which had been in use in 1914, complete with Imperial Russian eagle (see Appendix D).²³³ The fact that there had been a revolution four years previously did not induce the General Staff library to change its stamp. The style of military-scientific writing and thought, and the institutions involved, evince continuous evolution, regardless of which government happened to be in power.

This in turn leads to a view of Soviet military thinking and writing as somehow discrete from the rest of society. This was confirmed most recently by Tatyana Zaslavskaya, special adviser to President Gorbachev. According to Ms Zaslavskaya, to a civilian in the Soviet Union, 'the minds of the military continue to be unknowable'.²³⁴ To even a Soviet civilian,

"it is impossible to say what is in the mind of the army and security...they remain a closed imperial society, buttoned up. And their attitude to the upheaval in our society remains a very open question."²³⁵

The description of the modern Soviet military as 'an imperial society' is of particular interest. It is therefore the author's firm belief that one way into the mind of the army and other security forces (the KGB, MVD), is to start at the beginning, acquiring a long and deep perspective on modes of expression and attitudes, and strategic problems. That has been at the heart of this thesis.

With very few exceptions, the Russian and Soviet view of the character of future war and its place in the military scientific, procurement and planning processes has had to be distilled from works on Military Science, Doctrine and Art, from regulations, policy statements, and discussions of particular questions of military geography, equipment and force structuring. Foreign reports on Soviet perceptions and plans at a particular time may also yield information. The bibliography is divided into the broad areas identified above: archival and limited access; interviews, Russian and Soviet works (mainly non-fiction); Russian works in translation; Polish works; foreign military reports; and western language sources. There has been no previous attempt to analyse and collate this broad source base from this specific point of view, and many of the sources have been difficult to obtain and have not been analysed elsewhere at all.

NOTES TO PART ONE

1. Army General I E Shavrov and Colonel M I Galkin, Metodologiya voyenno-nauchnogo poznaniya, (Voyenizdat (Military Press), Moscow, 1977), p. 64 'Po svoey suti voyennaya nauka yavlyatsya naukoy o budushchey voyne'. The book seems to have been destined for use by officer students at the Voroshilov General Staff Academy, which Shavrov then commanded, and at other higher Military Academies (see pp. 19-28).
2. Leo Tolstoy, War and Peace, trans. Rosemary Edmonds, (2 Vols., Penguin, Harmondsworth, 1957), Vol. 2, p. 938. On Tolstoy's military career, S S Doroshenko, Lev Tolstoy, voyn i patriot: Voyennaya sluzhba i voyennaya deyatelnost' (Leo Tolstoy, Soldier and Patriot. Military Service and Military Activity (Sovetskiy pisatel', Moscow, 1966)).
3. Valeriy Bryusov, 'Zapadny front' ('Western Front'), Russkiye vedomosti, No 290, 17 December, 1914, poem dated 30 November, p.3, col.1. Bryusov describes the front as a sinister road or ribbon stretching from the Alps to the Pas de Calais. Whilst this conforms to our understanding of the western front in 1916, by 30 November 1914 the British front line trenches had not even been connected up and the front had acquired nothing like the permanence or stasis associated with it later. See Brigadier General J E Edmonds and Captain G C Wynne, History of the Great War based on Official Documents, Military Operations, France and Belgium, 1915, (Macmillan, London, 1927), pp. vi-vii, 4-5.
4. Ivan S Bliokh (usually referred to as Bloch. The author has transliterated his name exactly as it appears in Russian sources of his time using the system employed throughout this study), Budushchaya voyna v tekhnicheskoy, ekonomicheskoy i politicheskoy otnosheniyakh (Future War in its Technical, Economic and Political aspects), (5 Vols. plus atlas of diagrams, Tipografiya I A Yefrona, St Petersburg, 1898), plus Obshchiye vyvody iz sochineniya 'Budushchaya voyna...' (General Conclusions ...). The General conclusions, which form a sixth volume, are sometimes cited separately. Bliokh's study in many ways forms the foundation stone of this study, and is discussed in detail in part 3.

The full work was published in French in the following year, Jean de Bloch, La Guerre. Traduction de l'ouvrage russe La Guerre Future aux points de vue Technique, Economique et Politique, (5 Vols. (The General Conclusions are bound into Vol. 5), Guillaume et Cie., Paris, 1899). It was also published in German, Johann von Bloch, Der Krieg. Uebersetzung des russischen Werkes des Autors Der zukunfftige Krieg in seiner technischen,

volkswirtschaftlichen und politischen Bedeutung, (Puttkammer & Muhlbrecht, Berlin, 1899). The Russian, French and German editions contain identical illustrations, photographs, diagrams and drawings.

The microfiche edition of the Obshchye vyvody... (General Conclusions...) consulted by the author (The Helsinki University Library collection held in the National Library of Scotland) (426 pp.) contains no bibliography of sources cited, nor do the French and German editions. There is, however, a Polish edition of the General Conclusions, Jan Bloch, Wnioski Ogólne z dzieła Przysła wojna pod względem technicznym, politycznym i ekonomicznym, [note word order different in Polish] (Gebethner and Wolff, Warsaw, 1899), which contains the very substantial bibliography (Spis dzieł z których autor korzystał, pp. 337-65).

The General Conclusions were also translated into English under the rather misleading title Is War now Impossible. Being an Abridgement of "The War of the Future in its Technical, Economic and Political relations" by I S Bloch with a Prefatory Conversation with the Author by W T Stead (Grant Richards, London, 1899). This does not give a true idea of the immense scope and thoroughness of the original work, and unlike the original General Conclusions... does not contain marginal references to the appropriate sections in the previous five volumes.

5. Obshchye vyvody, p. 49; English translation, Is War now Impossible?, p. 41; La Guerre... tome 6, p. 45.

6. V A Melikov, Strategicheskoye razvërtivaniye (Strategic Deployment), (Voyenizdat, Moscow, 1939), Vol. 1, p. 514, cited in Colonel R A Savushkin, 'Zarozhdeniye i razvitiye sovetskoy voyennoy doktriny' ('The Birth and Development of Soviet Military Doctrine'), Voyenno-istoricheskii zhurnal (Military historical Journal, henceforward VIZh), 2/1988, pp. 19-26, this ref., p. 23.

7. Colonel A A Sidorenko, The Offensive, (translated under the auspices of the United States Air Force. US Government Printing Office, Washington, 1976), p. 61. Translated from the Russian Nastupleniye (Voyenizdat, Moscow, 1970).

8. The film shown in 1935 recorded the 1934 Minsk manoeuvres. The film of the 1935 Kiev manoeuvres received a wider audience. Ivan Maisky, (Soviet Ambassador to the UK), 'V Londone', ('In London'), in N I Koritskiy, ed., Marshal Tukhachevskiy: vospominaniya druzhey i soratnikov, (Marshal Tukhachevskiy: Memoirs of Friends and Comrades in Arms), (Voyenizdat, Moscow, 1965), p. 229.

9. Yevgeniy Zamyatin, We [My], trans. Bernard Guilbert Guerney, Introduction and Bibliography by Michael Glenny,

(Jonathan Cape, London, 1970), esp. pp. 21, 285; E J Brown, Brave New World, 1984 and We. An Essay on Anti-Utopia [Zamyatin and English Literature], (Ardis, Ann Arbor, m 1976), esp. p. 19; D J Richards, Zamyatin. A Soviet Heretic, (Bowes and Bowes, London, 1962), esp. p. 13.

10. See especially Isaac Asimov, A Choice of Catastrophes, (Hutchinson, London, 1980). War comes in the fourth class of catastrophes, after Apocalyptic and Galactic catastrophes, those affecting the Solar System and those affecting the Earth's climate, movement and stability. Wars, alongside major epidemics, form part of the class called 'the competition of life'.

11. See for example Sergei Goushev and Mikhail Vassiliev [sic.- publishers' transliteration], Russian Science in the 21st Century (McGraw-Hill, New York, 1960, translated from 1959), p. 62 where General Pokrovskiy, a remarkably talented man is interviewed about the use of explosives. He explained that 9,200 tons of ammonium nitrate had been used in a controlled explosion to blast away topsoil which would have taken a year to mine and expose a seam of ore. 'This unprecedented explosion was such a complicated, delicate and at the same time gigantic operation, that nobody in capitalist countries has ever attempted anything like it', he said, with apparent glee. What would have been the reaction of opposition parties and local interest groups had a mining operation in western Europe or even the US set off an explosion equivalent to a 9.2 kiloton nuclear weapon?

12. Col Gen (now Army Gen) M A Gareyev, 'Tvorcheskiy kharakter Sovetskoy voyennoy nauki v Velikoy Otechestvennoy voyne' ('The Creative Character of Soviet Military Science in the Great Patriotic War'), Voyenno-istoricheskii Zhurnal (Military Historical Journal)(VIZh), 7/1985, p. 9, 'the laws of strategy are objective and apply to both hostile sides'. The word polemology, the study of war, from the Greek polemos, a war, was coined by Gaston Bouthoul in 1946. See Roger Beaumont and Robin Edmonds, War in the Next Decade, (Macmillan, London, and Kentucky University Press, 1975), p. 3. On Military Science, see part 2 of the thesis.

13. Karl von Clausewitz, Vom Kriege, (first published 1832) translated as On War by Michael Howard and Peter Paret, (Princeton University Press, 1976), Bk. 3, ch. 8, p. 195, 'European armies are comparable in equipment, organization and training. Such differences as may exist are to be found in the spirit of the troops and the training of the commander'.

14. The US Strategic Defense Initiative is known by the initials of its direct Russian translation: SOI. Soviet representatives admitted the existence of their own version: Kosmicheskaya Strategicheskaya Oborona(KSO) to representatives of Edinburgh and Texas A&M Universities during the latter's visit to Moscow in 1988: conversation between the author and Professor Erickson.

15. Chris Bellamy, The Future of Land Warfare (Croom Helm, Beckenham and St Martin's Press, New York, 1987).

16. L I Brezhnev, speech 'Vydayushchiysya podvig zashchitnikov Tuly' ('The outstanding Victory of the Defenders of Tula'), ceremony of the award of the Gold Star to the Hero-City of Tula, Pravda, 19 January, 1977, pp. 1-2.

17. Definition of prognoz, Academy of Sciences of the USSR, Slovar' Russkogo yazyka (Russian Dictionary), (4 Vols., Russkiy yazyk, Moscow, 1983), Vol. 3, p 475.

18. Charles Issawi, ed., An Arab Philosophy of History. Selections from the Prolegomena of Ibn Khaldun of Tunis, 1332-1406, (John Murray, London, 1950), p. 7.

19. Raymond L Garthoff, ed. and trans., Science and Technology in Contemporary War by General G I Pokrovskiy, (Atlantic Books, London, 1959), p. viii. Garthoff's book comprises translations of one book, one pamphlet and one article by Pokrovskiy, respectively: Nauka i tekhnika v sovremennykh voynakh (Science and Technology in Contemporary Wars) (Voenizdat, Moscow, 1956); Rol' nauki i tekhniki v sovremennyoy voyne (The role of Science and Technology in Contemporary War[fare]), (Znaniye, Moscow, 1957), and an article on missiles in Sovetskiy Patriot, 11 September, 1957. On Pokrovskiy's multiple talents, see Vassiliev and Goushev, Russian Science..., pp. 60-61.

20. General A N Kuropatkin, The Russian Army and the Japanese War, trans. Captain A B Lindsay, ed. Maj. E D Swinton, (2 Vols., John Murray), London, 1909), Editor's Introduction, Vol. 1, p. xi. This book, apparently, was based on a faint carbon copy of a typescript, which Kuropatkin had been unable to publish. However, much of the same material appears in Kuropatkin's Zadachi russkoy armii (The Role of the Russian Army), (3 Vols., V A Berezovskiy, Commissioner of Military-Educational Establishments, St Petersburg, 1910). A condensed version of the analysis also appeared in the first four chapters of A Morskoy(ed.), Voyennaya moshch' Rossii. Predskazaniya Gen.-Ad. A N Kuropatkina i ikh kritika Gr. S. Yu. Vitte (The Military Power of Russia. Adjutant-General A N Kuropatkin's Predictions[see part 2] and Criticism by Count S Yu Witte), (M Popov, Petrograd, 1915)(signed

Petrograd 24 August, 1914). The title page featured attractive futurist lettering, and is reproduced as Appendix 3. The fifth chapter was Witte's criticism on financial grounds and the sixth an update on the present situation and the events of the 'currently unfolding' (nyne razygryvayushcheysya) World War.

21. Kuropatkin, The Russian Army... Vol. 1, p. 77, '...the attention of the War Department in the first years of the present century should be devoted to strengthening our position on that side [the West] and not diverted to aggressive enterprises elsewhere'. In the classic A A Svechin, Strategiya (Strategy) (Voyenny Vestnik Press, Moscow, 1927), Svechin stresses the strength of the strategic defensive, compared with the colossal resources needed to undertake the offensive, and that it could achieve a 'positive final aim' ('Strategicheskaya oborona i nastupleniye', pp. 182-6, esp. p. 183). Present policy: Army General D T Yazov, 'Voyennaya doktrina Varshavskogo Dogovora: doktrina zashchity mira i sotsializma' ('The Military Doctrine of the Warsaw Pact: the Doctrine of Defence of Peace and Socialism'), Pravda, 27 July, 1987, p. 5, especially col. 3 on 'Defensive sufficiency' (dostatocnost' dlya oborony). On 19 October 1988 the Deputy Chief of the Soviet General Staff and a distinguished writer on military theory, Colonel General M A Gareyev, in a lecture to the Royal United Service Institution in London which the author attended reiterated similar views and added that not only the political but also the military-technical component of Military Doctrine would need to acquire a defensive character.

22. On the Strategic Defence Initiative, concepts of 'anti-space defence' (protivokosmicheskaya oborona -PKO) existed as long ago as 1965, although it was described as a foreign concept - A I Radzievskiy, ed., Slovar' osnovnykh voyennykh terminov (Dictionary of Basic Military Terms, (Voyenizdat, Moscow, 1965). By 1978 PKO was clearly separated from normal air defence and the air defence forces - Sovetskaya voyennaya entsiklopediya (Soviet Military encyclopedia - SVE), (8 Vols., Voyenizdat, Moscow, 1976-80), Vol. 6, pp. 594-5. On the more recent Soviet scheme, KSO, see note 14. On the evolution of these concepts, David R Jones, 'Soviet military doctrine and space in the 1980s', in Carl J. Jacobson, ed., The Uncertain Course. New Weapons, Strategies and Mind-sets, (SIPRI/Oxford University Press, 1987), pp. 93-135.

23. Brief entries on Military Districts and the 'Military Reforms of 1860-70' are in the Voyenny entsiklopedicheskiy slovar' (Military Encyclopedic Dictionary) (VES) (2nd ed., Voyenizdat, Moscow, 1986), pp. 146, 634. For more detailed accounts see the multi-volume D A Skalon, ed.,

Stoletiye voyennago ministerstva (A Hundred Years of the War Ministry), (St Petersburg, 1902), III otd. VI pp. 241-61, on Milyutin and Military Districts and III. Otd. IV, 1.1. Prilozheniye (Appendix), pp. 427-529, which includes coloured maps of the Military Districts in 1867 (between pp. 506-07) and 1881 (pp. 578-9). The first Military District formed was Warsaw, in 1862, followed by Vil'na, Kiev and Odessa and then, in 1864, St Petersburg, Finland, Moscow, Khar'kov and Kazan'. The other basic source is P A Zayonchkovskiy, Voyennye reformy 1860-70 godov v Rossii (The Military Reforms of 1860-70 in Russia) (Moscow, 1952).

24. Baron Antoine Henri Jomini, Précis de l'Art de la Guerre, 2nd edn. (the first was dedicated to the Tsar in a dedication of 6 March, 1837), 1-ère partie, (Librairie pour l'Art Militaire, les Arts et les Sciences, Paris, 1855).

25. Egerton MSS 3168, Department of Manuscripts, British Library, ff. 67-68. The drafts of these letters, full of crossings out, were retained as a record, the fair copy sent to the addressee.

26. A Skugarevskiy, 'Voyennaya igra, yeya literatura i znachenie' ('The War Game, its Literature and Significance'), Voyenny Sbornik (VSb), Vol. 95, 1/1874, Unofficial Section (US) pp. 59-70; ibid., 'Voyennaya igra, yeya pol'za i nedostatki' ('...its value and inadequacies'), VSb Vol. 102, 4/1875, US pp. 223-30. This journal comprised 'official' and 'unofficial' sections, the former containing official announcements and circulars, the latter all the works of military thought. Henceforward, references are to the US unless otherwise stated.

In an article by A Leonidov, 'Voyenny istorik A K Puzyrevskiy' ('The Military Historian A K Puzyrevskiy'), VIZh 1/1969, pp. 91-97, the author attributes an anonymous article to Skugarevskiy, 'O voyennoy istorii' ('On Military History') VSb, 1/1875, pp. 5-38. This article contains clear references to the 'future war' problem, and the modern attitude to the use of history, though without the term budushchaya voyna. 'To determine the future is the final aim of all human knowledge. The study of the past, like any study, has no significance in itself, if we do not try to make use of the results of science, to apply them to further life. He who can really understand the lessons of military history and put them into practice, can really predict (pred"ugadayet) the future development of a given question and prepare himself to solve it, can understand the character of employing military art in the next (sleduyushchey) war, and can rely on success' (p. 34). He concludes; 'Voyennaya istoriya v obshchem dolzhna predstavit' nam zakony razvitiya voyennogo iskusstva, chtoby my mogli pravil'no

ponyat' sovremennoye yego polozheniye i napravleniye dal'neyshego dvizheniye vpered ('Military history in general must give us rules for the development of Military Art in order that we may correctly understand its present position and the direction of further forward movement')(p. 36).

27. G A Leyer, 'Strategiya-nauka i strategiya-iskusstvo' (po povodu stat'i g. Zhilinskago) ('Strategy - a science and Strategy - an art' (Regarding Zhilinskiy's Article)), VSb 1/1874, pp. 29-58.

28. N.Z., 'Zadachi kavalerii v sovremennykh voynakh', VSb 9/1877, pp. 25-43.

29. Ibid., p. 25 '...byli i budut zadachami kavalerii v budushchikh voynakh...

30. [P] Skobel'tsyn [no initial] 'O zanyatiyakh kavalerii', VSb 11/1871, pp. 47-64, para. 3 'trebovaniyam sovremennoy voyny'.

31. Staff Captain Puzyrevskiy, 'Obozy i vliyaniye ikh na takticheskuyu operatsiyu' ('Supplies and their influence of tactical operations'), VSb 9/1873, pp. 111-48, 10/1873 pp. 343-65, this ref. p. 343 'obschiy kharakter sovremennykh voyennykh deystviy...

32. A Skugarevskiy 'Novye trebovaniya taktiki v vidu ozhidayemykh izmeneniy v pekhotnom ustave' ('New requirements of tactics in view of the expected changes in the Infantry Regulations') VSb 4/1876, pp. 304-332. P. 304 '...kharakter sovremennago boya drugoy'.

33. The huge volume of writing from this period is catalogued in detail in part 3. A selection of works on the effect of new technology might include: N P Mikhnevich, Vliyaniye noveyshikh tekhnicheskikh izobretenii na taktiku voysk (Influence of the Latest Technological Inventions on Forces' Tactics), (St Petersburg, 1893), an extract from which is reproduced in L G Beskrovniy, ed. Russkaya voyenno-teoreticheskaya mysl' xix i nachala xx vekov (Russian Military Theoretical Thought of the 19th and early 20th centuries) (Voenizdat, Moscow, 1965); D Maslovskiy, 'Mysli o tekhnike voyn budushchago', ('Thoughts on the Technology of Future Wars'), VSb 5/1893, pp. 35-55; 6/1893, pp. 255-71; 8/1893, pp. 221-38; 9/1893, pp. 32-55.

On the new 'mass' armies see Fedor Gershel'man, 'Kavaleriya v sovremennykh voynakh' ('Cavalry in Contemporary Wars'), VSb 7/1898, pp. 76-121, 8/1898 pp. 424-441; 9/1898 104-31. In addition to dealing specifically with cavalry, Gershel'man opined that future armies would be less mobile and less flexible than

hitherto (part 1, p. 79); P Geysman, 'Opyt izsledovaniya taktiki massovykh armiy' ('Experience of Researching the Tactics of Mass Armies'), Vsb, 3/1894, pp. 1-34; 5/1894, pp. 1-34; 6/1894, pp. 219-48; 8/1894, pp. 222-31; 9/1894, pp. 5-16; 10/1894, pp. 225-55; 2/1895, pp. 249-84; N P Mikhnevich, 'Poyavyatsya-li millionniya armii v budushchey bol'shoy evropeyskoy voyny?' (Zametka po povodu stat'i A Petrova "K voprosam strategii")' ('Will Million-Strong Armies Appear in a Future Major European War?' (Remarks on A Petrov's Article "On Questions of Strategy")), Vsb, 2/1898, pp. 260-64.

34. A M Kavtaradze, Voyennye spetsialisty na sluzhbe Respubliki Sovetov, 1917-20 gg. (Military Specialists in the Service of the Soviet republic), (Nauka, Moscow, 1988). Of the military theorists writing and teaching in the 1890s, those most influential on the Soviet command would be N P Mikhnevich (1849-1927), and Aleksandr Neznamov (1872-1928). Neznamov influenced students like Boris Shaposhnikov, a young Imperial officer who later contributed much to Soviet Military Thought and became chief of the Soviet General Staff, a position he held at the outbreak of the Great Patriotic War. On the careers and influence of these individuals, see part 3.

35. Clausewitz, On War, Bk. 2, ch. 3, Paret and Howard Edition p. 149: 'we therefore conclude that war does not belong in the realm of arts and sciences: rather, it is part of man's social existence'.

36. VES (1986), pp. 239-40.

37. Col Gen F F Gayvronskiy, ed., Evolutsiya voyennogo iskusstva: etapy, tendentsii, printsipy (The Evolution of Military Art: Stages, trends, Principles, (Voenizdat, Moscow, 1988).

38. Ibid., p. 245.

39. Arthur I Waskow, 'The Historian's Role in Futures Research', Futures, The Journal of Forecasting and Planning (hereafter, Futures), December 1968, pp. 117-24, this, p. 117.

40. I F Clarke, 'The First Forecast of the Future', 'Patterns of Prediction', Futures, June, 1969, pp. 325-30. Clarke's book Voices Prophesying War, 1763-1984 (Oxford University Press, 1966) is a cardinal work and is of related interest to this study. However, it concentrates principally on fictional visions of future war and has very little on the Russians. It was completed at a time when the fictional genre was focussing on the post-nuclear novel, such as Shute's On the Beach (1957). See also note 151. Clarke has been a regular contributor

to Futures: see in particular his series of articles 'Patterns of Prediction': 'Jules Verne and the Vision of the Future' (September 1969, pp. 464-68), 'Forecasts of Future Wars 1871-1914' (December, 1969, pp. 553-57), 'The Predictive Utopia', (March, 1970, pp. 65-69), 'H G Wells: Exponent of Extrapolation', (June, 1970, pp. 171-75), 'H G Wells: Preacher and Prophet', (September, 1970, pp. 270-71), 'Methods of Prediction, 1918-39' (December, 1970, pp. 375-79), 'Anxious Anticipations 1918-39', (March, 1971, pp. 72-76), 'The Tribulations of Technology', (June, 1971, pp. 169-72), 'Forecasting: Facts and fallibilities', (September 1971, pp. 302-05). See also 'The Image of the Future, 1776-1976', Futures, March, 1976, pp. 68-72, 'A Future without Futurologists, 1770-1870', *ibid.*, June 1980, pp. 238-245, 'The First Law of Futures', *ibid.*, April, 1987, pp. 197-208 'Science and Fiction: the Good and the Bad', *ibid.*, December, 1987, pp. 716-26, 'And That was the Future', *ibid.*, April, 1988, pp. 182-93.

41. Queuing Theory - teoriya massovogo obsluzhivaniya originally arose from the need to design telephone exchanges to cope with a large number of incoming calls. It was developed by A K Erlang, working for the Copenhagen telephone company, from 1908. McGraw-Hill Encyclopedia of Science and Technology (5th ed., McGraw-Hill, New York, 1982, Vol. 11, pp. 208-09. The Russians have applied it to 'servicing' targets on the battlefield: see A I Lukin, Sistemy massogo obsluzhivaniye: Analiz sistem massovogo obsluzhivaniya s otkazami v voyennoy praktike (QT Systems: an Analysis of QT Systems with Implications for Military Practice), (Voyenizdat, Moscow, 1980) (8000 copies). The idea of servicing systems (weapons) and serviced systems (targets) is represented graphically on p. 7, fig. 1.1. This approach is also evident from Ye K Malakhovskiy, Strel'ba na porazheniye opornykh punktov (Fire for the destruction of Defensive Positions), (Voyenizdat, Moscow, 1978).

42. Modern English usage defines a system guided during its flight as a missile and an unguided one as a rocket. The Russian noun for both is raket: where necessary, they specify whether it is guided (upravlyayemy) or unguided (neupravlyayemy). The author is inclined to translate raket as rocket, whether guided or not. Realisation of the potential of long range rockets developed naturally from the Soviet artillery tradition. See part 3 for the literature on this question.

43. See note 4, above, and part 3.

44. I am grateful to one of my former teachers at the Polytechnic of Central London, Professor Newmark, for laying the foundations of a theoretical approach to these

problems. See Peter Newmark, Approaches to Translation, (Pergamon, Oxford, 1981).

45. Sovetskaya voyennaya entsiklopediya. The decision to publish this second, most recent Soviet Military Encyclopedia was taken in 1972. The first two volumes (both 1976) were issued under the presidency of then USSR Minister of Defence Marshal of the Soviet Union A A Grechko; the remainder under that of Chief of the General Staff Marshal N V Ogarkov. On earlier military encyclopedias see notes 104, 105.

46. Voyenny entsiklopedicheskiy slovar' (Military Encyclopaedic Dictionary- VES) (2nd edition, revised, Voenizdat, Moscow, 1986). Marshal Sergey Akhromeyev was Chief of the Editorial commission. The earlier edition is from 1983.

47. A Nikonov and G Tummeltau, 'Budushchaya voyna' in Sovetskaya voyennaya entsiklopediya (Soviet Military Encyclopedia), (Vol. 2, Gosudarstvennoye slovarno-entsiklopedicheskoye izdatel'stvo, Moscow, 1933), 834-44, quotation p. 834. Work on this first edition of the Soviet Military Encyclopedia began in response to a USSR revolutionary Military Soviet (RVS) order of 1928. People's Commissar for Military and Naval Affairs K E Voroshilov presided over the editorial committee, and many eminent authorities participated in its compilation including B M Shaposhnikov, R P Eydemann, I P Uborevich, M N Tukhachevskiy and I E Yakir. However, only the first two volumes, up to 'Varta' were published, in 1932 and 1933, respectively. See M M Kir'yan, Problemy voyennoy teorii v sovetskikh nauchno-spravochnykh izdaniyakh (Problems of Military Theory in Soviet Scientific-Reference Publications) (Nauka, Moscow, 1985, pp. 9-15. Kir'yan noted the article on 'future war' with particular interest.

48. Nikonov and Tummeltau in SVE, Vol. 2(1933), p. 834

49. An early draft of part of this thesis was provided to the US team as briefing in confidence. A private and confidential report on the discussions with the Soviet General Staff, addressing particular questions posed by the author, is in the author's possession.

50. De-briefing of Lt Col (retd.) John Hines after his visit to Moscow in December 1989.

51. Stephen R Covington, Lt Col James F Holcomb, Soviet Military Studies Group, Supreme Headquarters Allied Powers Europe (SHAPE), 22 January 1990. CSBM Seminar on Military Doctrine, Vienna, Week One, Soviet Military Doctrine. Typescript in possession of the author.

52. Interview with Dr Sergey Karaganov, Deputy Head of the USSR Europe Institute, Edinburgh University, 2 December 1989.

53. Conversation with Sergey _____, a 4th year student in the Faculty of Programming Languages and Cybernetics, University of Moscow, Centre for Human Ecology, Edinburgh University, 12 October 1989, and Edinburgh Conversations, Abden House, University of Edinburgh, 5-8 December, 1988.

54. Interview with Viktor Suvorov, offices of Hamish Hamilton, Kensington, 18 April 1990.

55. This material is recounted in parts 4 and 5. Conversation with Army General Mikhail Moiseyev, Soviet Ministry of Defence, 14 May 1990 (criticism of non-General Staff analysts); Remarks made by Lieutenant General Lebedev, Ryazan' Higher Airborne Command School, 16 May, 1990 (internal role of Soviet Armed Forces); interview with Army General Vitaliy Shabanov, on a flight from Leningrad to Moscow, 18 May 1990; (internal role of Armed Forces, low intensity operations, professional army, character of future war; conversation with Major _____, Lenin Military-Political Academy, Moscow, 15 May, 1990 (threat from China).

56. Mary C Fitzgerald Changing Soviet Doctrine on Nuclear War (Centre for Foreign Policy Studies, Dalhousie University, Halifax, Nova Scotia, 1988); 'Marshal Ogarkov and the New Revolution in Soviet Military Affairs', Defence Analysis, Vol. 3, No. 1, March, 1987, pp. 3-19. On Tula, see note 16. The speech itself contained no specific reference to conventional war doctrines but on p.2, col. 2, he rejected the idea of a 'first strike' and the utility of nuclear war.

57. John Hines interview with Dr Tsygichko, 19 December 1989. Dr Tsygichko apparently invented a model for Theatre operations in about 1965, the subject of a book written in 1967 which remained Top Secret (sovershenno sekretno) for twenty years.

58. Fitzgerald, see note 56; Marshal Nikolay Ogarkov, 'Zashchita sotsializma; opyt istorii is sovremennost' ('The Defence Of Socialism: the Experience of History and the Present'), Krasnaya Zvezda (Red Star)(KZ), 9 May 1984, pp. 2-3, this quotation p. 3, col. 5.

59. John Hines interview with Maj. Gen. Kirshin, 10 January 1990.

60. Egerton MSS 3168, ff. 67-68.

61. Ministère de Defense, Service Historique de l'Armée de Terre, Chateau de Vincennes (SHAT), Carton 7N 1485 , Janin to Vignal, letter to Vignal, 27 October, 1910.

62. Although the original Russian strategic plan does not appear to have survived, Obruchev's comments on it have in Osoboye pribavleniye k opisaniyu Russko-Turetskoy voyny 1877-78 gg. na Balkanskom poluostrove, Vypusk IV, Soobrazheniya, kasayushchiyasya plana voyny (Special Supplement to the Description of the Russo-Turkish War 1877-78 in the Balkan Peninsula, Edition IV, Reports relating to the War Plan), (Military Historical Commission of the General Staff Press, St Petersburg, 1901). See in particular pp. 27, 31-2, cited in part 3 of the thesis.

63. See note 20.

64. Col R A Savushkin, 'Zarozhdeniye i razvitiye sovetskoy voynnoy doktriny' ('The birth and development of Soviet Military Doctrine', VIZh, 2/1988, pp. 19-26, this reference pp. 21-22. The TsGASA reference is F. 33988, op. 2, d. 682, ll. 21-22.

65. Interview with Col. (now Maj. Gen.) Viktor Filatov, editor of VIZh, the Edinburgh Conversations, 8 December 1988. This approach was unsuccessful. The Association for Commercial Cooperation, Soviet Archive Service, run by the organization MITEK, began operations in 1990 from Leningradskiy Prospekt 125004. 700 pages: conversation with Peter Maggs of Mitek's USA office.

66. Savushkin, 'Zarozhdeniye...', p. 21.

67. Ya M Zhigur was a senior professor at the M V Frunze Military Academy and then at the General Staff Academy (founded 1936), and also Deputy Head of the Chemical Directorate - see the list of other important figures in Soviet Military Thought in Voprosy strategii i operativnogo iskusstva... (1965), p. 741. He wrote 'Operativny plan voyny Shliffena i sovremennaya devstvitel'nost'' ('Schlieffen's Operational War Plan and Present-day reality'), VM 6/1929, pp. 3-16; 7/1929, pp. 3-14. Yan Karlovich Berzin (1889-1938) was Deputy Chief of the Intelligence Directorate from 1921 and Chief from 1924 to 1935. He was awarded the Order of the Red Banner in the same year as the study, 1928. He was second in command of the Special Far Eastern Army from 1935 to 1937, but purged in 1938: SVE, Vol. 1 (1976), p. 453; Mariya Polyakova, 'Po zadaniyu Ya K Berzina' ('On the Instructions of Ya K Berzin'), VIZh 3/1990, pp. 58-62.

68. Werner von Blomberg, Visit of the Chief of the Army Board to Russia, August to September, 1928, (Reichswehr Ministerium, Army Department, Berlin, 17 November 1928), trans. W R Newby-Grant. 'The Russians display a lively

interest in the [gas] experiments and support them fully'(p. 3)...'V[Voroshilov] laid great emphasis upon the expansion of the scope of the joint [gas] trials'(p. 5)...in summary, Chemical Warfare was an area particularly 'worthy of note' (p. 24).

69. Rokovye Yaytsa - the Fatal Eggs. Mikhail Bulgakov, Diaboliad and other Stories, Ed. Ellendea Proffer and Carl R Proffer, trans. Carl R Proffer, Indiana University press, Bloomington and London, 1972), story pp. 48-134. The story is signed October 1924 and was first published in Nedra, No. 6, (Moscow, 1925), pp 79-148 (Proffer and Proffer, p. xiii).

70. SVE Vol. 2 (1933), pp. 834-44.

71. 'Lectures from the Voroshilov General Staff Academy' (Introduction by Graham H Turbiville, Jr.), The Journal of Soviet Military Studies (hereafter, SMS), Vol. 1, No. 1, April, 1988, pp. 29-53. Also published as Col (retd.) Ghulam D Wardak, Afgan Armed Forces and Graham H Turbiville, Jr., Introduction by Raymond L Garthoff, The Voroshilov Lectures. Materials from the Soviet General Staff Academy, (Vol. 1, National Defense University Press, Washington, 1989).

72. Ibid., Turbiville introduction in SMS, p. 29.

73. Ibid., p. 30.

74. Ibid., pp. 31-33 ('Content of Military Strategy'), pp. 35-37 ('Strategy and Military Doctrine'), pp. 37-49, ('Likely characteristics of War in Contemporary Times', embracing socio-political, economic, military-technical, military-geographic and 'other' factors). These are collated under the heading 'Principles and Content of Military Strategy', as chapter one of Wardak and Turbiville, pp. 55-78.

75. . A V Golubev, M V Frunze o kharaktere budushchey voyny, (Voyenizdat, Moscow, 1931); see also V Polikarpov, 'Istoriik grazhdanskoy voyny A V Golubev' (A V Golubev: Historian of the Civil war'), VIZh 7/1968, pp. 65-67.

76. G Khmelevskiy, ed. kombrig K I Sokolov-Strakhov, Mirovaya Imperialisticheskaya Voyna 1914-18 gg: sistematicheskii ukazatel' knizhnoy i stateynoy voyenno-istoricheskoy literatury za 1914-1935 gg.. (The World Imperialist War of 1914-18: a systematic index of Books and Articles from 1914-35), (Scientific-Research Department of the M V Frunze Military Academy Press, Moscow, 1936).

77. E I Martynov, Strategiya v epokhu Napoleona I i v nashe vremya, (General Staff Press, St Petersburg, 1894), [written at Khar'kov between 1 October 1892 and 10 November, 1893]

78. See note 21.

79. There have been several articles analysing military journals as sources: M Savinskiy, 'Zhurnal "Voyennaya mysl' i revolyutsiya" kak istochnik po istorii Sovetskikh Vooruzhennikh Sil' ('The Journal Military Thought and the Revolution as a source for the History of the Soviet Armed Forces'), VIZh 2/1974, pp. 100-105; Captain V P Alekseyev, '"Morskomu sborniku" - 140 let' (140 Years of Morskoy Sbornik-Naval Review), VIZh 3/1988, pp. 92-96. SVE Vol. 2 (1976) pp. 224, 266, 272 has entries on Voyenno-istoricheskii zhurnal, Voyenny vestnik and Voyenny zhurnal (1840-1859), and Voyenny sbornik, respectively.

80. Voyenny Vestnik, (Military Herald - VV), founded in 1921. Among the earliest articles see 'Yedinaya voyennaya doktrina' ('Unified Military Doctrine'), VV 4/1921, p. 2; Ya Dvinovitskiy, 'Voyna pri pomoshchi bakteriy' ('Biological Warfare') (a critique of foreign ideas), VV 4/1921, p. 6; the article on the reorganization of the General Staff Academy, VV 5/1921, pp. 10-11; Fillip Anulov, 'Chelovek ili mashina - mashinzatsiya' ('Man or Machine - Machine Warfare' (see part 2, note 18), VV 7/1921, pp. 20-21; 'Bor'ba s tekhnikoy protivnika' ('War With Enemy Technology'), VV 1/1922, pp. 9-10 and A Verkhovskiy, 'Taktika gazovoy voyny' ('Chemical Warfare Tactics'), VV 2-3/1922, p. 11. During the 1920s and 30s Voyenny Vestnik published much material relating to the development of the deep battle and operation. It was amalgamated with Krasnaya Armiya i Shkola (Red Army and School) in 1927, and in 1960 with the former Artilleriyskiy zhurnal (Artillery Journal), Tankist (Tank man), Voyenno-inzhenernyi zhurnal (Military Engineers' Journal) and Voyenny svyazist (Military Signaller). Thus the journals of four principal arms: artillery, armour, engineers and signals, going back to Tsarist times, were amalgamated into a single all-arms journal. Since then, VV has concentrated on specialised and technical matters rather than matters of operational art and strategy.

81. One of the most significant 'journals' (it is more like a book), Voyennaya nauka i Revolyutsiya (Voyenno-nauchny zhurnal ...) (Military Science and the Revolution (A Military-Scientific Journal...)) (VNiR) (otdel voyennoy literatury pri revolyutsionnom voyennom Sovete Respubliki (Department of Military Literature attached to the Revolutionary Military Soviet of the Republic), Moscow, 1921). See in particular M V Frunze, 'Yedinaya voyennaya doktrina i Krasnaya armiya' ('A Unified Military Doctrine

and the Red Army'), pp. 30-46; G Girs, 'Zadachi nauki i voyennaya doktrina v svyazi s perezvivayemoy nami revolyutsionnoy epokhi' ('Aims of Science and Military Doctrine in Connexion with the Revolutionary Epoch which we are living Through'), pp. 47-86; M N Tukhachevskiy, 'O taktike aviatsii' ('On Air Tactics'), pp. 87-94; B M Shaposhnikov, '"Konnye massy" na flange armii. Ocherk Deystviy russkoy konnitsy na levom beregu Visly v avguste 1914 g.' ('"Cavalry Masses" on the Army's Flank. Sketch of the Action of Russian Cavalry on the left bank of the Vistula, August, 1914'), pp. 95-126 (in particular p. 96 in which he uses the word 'operational' to describe the operational level of war in the modern sense); and 'Perspektivy budushchey mirovoy voyny', ('Perspectives on a Future World War'), pp. 386-391, which principally addresses the political character of future war, but is nonetheless most relevant to this study.

82. Revolyutsiya i voyna: Voenno-nauchny zhurnal (Revolution and War: a Military Scientific Journal-RiV) (Directorate of military-educational establishments of the Western Front) (UVUZZAPA), which contains key articles: M N Tukhachevskiy 'Revolyutsiya izvne' ('Revolution from Without'), RiV, 3/1920, pp. 45-54; G B Gay [a famous Civil War Cavalry Commander] 'Nedostatki v organizatsii Krasnoy Konnitsy' ('Inadequacies in the organization of Red Cavalry'), RiV, 6-7/1921, pp. 49-68; M Batorskiy, 'Konnitsa' ('Cavalry'), pp. 122-149; M Batorskiy, 'Presledovaniye i vykhod iz boya' ('Pursuit and disengagement from combat'), RiV, 8/1921, pp. 37-49; and, in particular, M Batorskiy, 'Neskol'ko mysley o faktorakh, vliyayushchikh na formy budushchikh voyn' ('Thoughts on Factors, Influencing the Form of Future Wars'), RiV, 13/1921, pp. 59-68. See also M Kuz'min, 'Voyska strategicheskoy oborony i manevrennoy taktiki' ('Forces of Strategic Defence and Manoeuvrist tactics'), RiV, 23/1923, pp. 5-18. The 1923 editions (now called a 'scientific military-political journal'), were divided into sections devoted to Strategy and Tactics, Military Technology, Military History and Military Geography and Statistics, mirroring the division of disciplines in Imperial Russian military thought.

Crucial later articles are: V Triandafilov, 'Vozmozhnaya chislennost' budushchikh armiy' ('The possible Strength of Future Armies') Voyna i Revolyutsiya (as the journal had been re-titled -ViR), 3/1927, pp. 14-43; 'Indeks' (a pseudonym), 'K voprosu o raskhode ogneprilasov v budushchey voyne' ('On the Question of Ammunition Expenditure in a Future War'), ViR 3/1927, pp. 44-52. B Dolivo-Dobrovolskiy (see also note 139) introduced the section 'V zarubezhnykh armiyakh' ('In Foreign Armies', ViR 4/1928, pp. 131-54, observing that 'the influence of technology and scientific-technical creativity on military affairs is now increasing with every day' (p.

131). This clearly influenced the appearance of 'Taktika i oruzhiye budushchego' ('Tactics and Weaponry of the Future'), a short editorial in ViR 10/1928, in which the editors introduced a series of articles connected with the 'great technological reinforcement' of the Red Army. The reorganization of foreign armies on a 'new technical base' required the USSR to respond in kind. A A Svechin, 'Gosudarstvenny i frontovoy tyl' ('The Rear Area of the State and of the Front'), ViR, 11/1928, pp. 94-198; R Eydeman, 'Mimokhodomn o nashey kritike (po povodu retsenzii T Shvartsa)' ('On Our Criticism in Passing (apropos Schwartz's review)'), ViR, 1/1929, pp. 147-48; V Novitskiy, 'Deystviya aviatsii v nachal'nom periode voyny' ('Air Action in the Opening Period of War'), ViR 9/1929, pp. 23-31; N Varfolomeyev, 'Strategiya v akademicheskoy postanovke' ('Strategy in an Academic Setting'), ViR, 11/1929, pp. 78-93 (on the Red Army Academy); 'K voprosu o kharaktere nachal'nogo perioda voyny' ('On the Question of the Character of the Opening Period of a War'), ViR, 3/1931; R Tsiffer, 'Kharakteristika predstoyashchey voyny' ('The Characteristics of an Impending War'), ViR 10-11/1931; S Vishnev, 'Problemy perevooruzhenii inostrannykh armiy' ('Problems of the Rearmament of Foreign Armies'), ViR 4/1932, pp. 68-78; I Ivanov, 'Operatsii ogranichennymi silami protiv prevoskhodnykh sil protivnika' ('Operations with Limited Forces against Superior Enemy Strength') ViR, 2(March-April)/1934, pp. 13-30; N Zhuravlev, 'Operativnoye sosredotocheniye' ('Operational Concentration'), ViR, 11-12, 1935.

83. Holdings of Krasnaya Armiya (Red Army), Mobilizatsionny sbornik and Voyennoye Delo (Military Affairs) are patchy. Krasnaya zvezda is available throughout the period from 1 January, 1924 when it was founded - see the entry in VES (1986) p. 369.

84. For example, Kuz'min, 'Voyska strategicheskoy oborony i manevrennoy taktiki', Riv 23/1923 came from a US source: Triandafilov 'Vozmozhnaya chislennost' budushchikh armii', ViR, 3/1927; Varfolomeyev, 'Strategiya...', ViR 11/1929; M Sukharevskiy, 'Minno-podzemnoye delo v voyne budushchego po opytu mirovoy voyny' ('Mining and Subterranean Warfare in (a) War of the Future'), VMiR 5/1923, pp. 205-10 and 'Geologiya, kak novy, vydvinyuty mirovoy voynoy, faktor v voyenno-inzhenernom dele' ('Geology, as a new factor in Military Engineering which emerged as a result of the World War'), VMiR 2/1924, pp. 183-201 were some of the 'gifts' from the Lenin State Library.

85. Voyennaya Mysl' (Military Thought - VM). For analyses of the impact of weaponry on future war, see in particular S Gavrilov, 'Tyazhelaya artilleriya v budushchey

voyne' ('Heavy Artillery in future War'), in VM 9/1937, pp. 59-74 and Maj Gen P G Yegorov, 'Podvizhnost' ('Mobility'), VM 10/1940, pp. 77-85 (see also part 3). After World War II, VM continued to feature articles on fairly detailed operational-technical questions, for example Col A Tonkikh, 'Nekotorye tendentsii v razvitii raketno-artilleriyskiykh protivotankovykh sredstv' ('New Tendencies in the development of Anti-Tank Artillery and Rockets'), VM 3/1965, pp. 41-51, and wider articles on the state and economy at war, for example Col M Srednev, 'K voprosu o roli ekonomiki v yadernoy voyne' ('On the Question of the Role of the Economy in Nuclear War'), VM 11/1965, pp. 27-36. It is of interest that whilst the journal was 'for Generals and Admirals only', many of its authors were Colonels!

86. The anonymous leader 'Oboronitel'ny kharakter sovetskoy voyennoy doktriny i podgotovka voysk (sil)' ('The Defensive Character of Soviet Military Doctrine and the Training of Forces'), VM 1/1988 pp. 3-13 and Army Gen. G N Salmanov, 'Sovetskaya voyennaya doktrina i nekotorye vzglyady na kharakter voyny v zashchitu sotsializma' ('Soviet Military Doctrine and Certain Views on the Character of War in the Defence of Socialism'), VM 12/1988, pp. 3-13 both mysteriously appeared via inter-library loan in 1989. In 1990, the State Library of the Czech Socialist Republic began releasing recent, formerly restricted VMs. Notable articles in the context of this thesis were Maj Gen I N Vorob'ev, 'Novaya oruzhiyye-novaya taktika' ('New Weapons - New Tactics'), VM 6/1984, pp. 47-59 and Col. E G Korotchenko 'Novye sredstva vooruzhennoy bor'by i kharakter sovremennykh nastupatel'nykh operatsii' ('New means of Armed Struggle and the Character of Contemporary Offensive Operations'), VM 11/1984, pp. 47-58. The author received subscription copies of VM from January, 1990.

87. VIZh is described as an 'organ of the Ministry of Defence' and began publication in August, 1939 although there was a break from 1941 to 1959 (see VES (1986) p. 141).

KVS in its present form appeared from 1960, a descendant of Politrabotnik, Propagandist RKA (to 1940), Agitator i propagandist Krasnoy Armii (to 1946), Propagandist i Agitator Krasnoy Armii (to 1947), Propagandist i Agitator and Partiyno-politicheskaya rabota v Sovetskoy Armii i Voenno-Morskom Flote (to 1960) (VES (1986), p. 345). It is published by the Main Political Directorate, but includes articles on military technical as well as political aspects of future war. See in particular Maj N Yefimov, 'V plenu tekhnokraticeskikh illyuzii- voyenny aspekt NTR: nesostoyatel'nost' burzhuaznykh traktovok' ('Prisoners of Technocratic Illusions' - The Military Aspect of the Scientific-

Technical Revolution: the Bankruptcy of Bourgeois Tracts'), KVS, 12/1988, pp. 83-87. The author criticizes western views on the possibility of 'war by mistake', the use of computers and robots and 'technocratic models of wars and armies of the future'(p. 87)(see part 4). KVS appears 24 times in a year, and articles therein are cited by number only and not by month.

88. Col. D Palevich, 'Kharakter i osobennosti sovremennoy voyny', Kommunist vooruzhennykh sil (KVS), 21/1962, pp. 76-82, this p. 76.

89. Lt Col V Kozlov, 'Kharakter i osobennosti sovremennoy voyny', KVS, 19/1969, pp. 72-78.

90. Aviatsiya i kosmonavtika from 1961, previously, from 1918, Vestnik Vozdushnogo flota. SVE Vol. 1, pp. 59-60. The fact that it was renamed to include the space component in the same year as Col. Gagarin's first manned space flight suggests a remarkable awareness of the impact of new areas of military technology. Tekhnika i vooruzheniya was published from April 1925 with a break from 1942 to 1960. The end of the 1950s and beginning of the 1960s thus saw the (re)appearance of all the current journals.

91. Col. Yu Molostov, Col. A Novikov, 'Countering High-Precision Weapons', Soviet Military Review, 10/1989. pp. 6-8, this p. 8.

92. M N Tukhachevskiy, 'Bor"ba s kontrrevolyutsionnymi vosstaniyami'('Fighting Counterrevolutionary Insurrections'), Part 1, Revolyutsiya i voyna (Revolution and War-ViR), 7(July)1926, pp. 3-17, part 2, 8(August)1926, pp. 3-15.

93. R Tsiffer, 'Zametki o voyne na malokul'turnykh teatrakh i metode yeye izucheniya'('Remarks on Warfare in Undeveloped Theatres and the Method of Studying them'), ViR, 11/1928, pp. 132-40. The most important characteristics from a military point of view (p. 134) of an 'undeveloped' theatre are the lack of roads and railways and density of population, but political situation, relief and soil conditions (marsh-desert-tundra) may also be important. Tsiffer's main conclusion was that the less developed the region the less likely it was to favour the development of an extended positional front as in 1914-18 in the West.

94. 'First public subscription to MVD Journal', Radio Liberty Report on the USSR, 8 September, 1989, p. 48 (report dated 1 September).

95. For example, A Kokoshin, V Larionov, 'Kurskaya bitva v svete sovremennoy oboronitel'noy doktriny' ('The Battle of Kursk in the Light of Modern Defensive Doctrine'), Mirovaya ekonomika i mezhdunarodnye otnosheniya (World Economics and International Affairs) (MEMO), 8/1987, pp. 32-40 (part of a major debate - see part 4); V Larionov, 'Problemy predotvrashcheniya obychnoy voyny v Evrope' ('The Problems of Preventing Conventional War in Europe'), MEMO 7/1989, pp. 31-43. The latter sets out a series of formulae for calculating the relative values of conventional forces and armaments. See part 4.

96. For example, Andrei Kokoshin 'Alexander Svechin on War and politics', International Affairs 11/1988, pp. 118-26, 106.

97. V Kulikov, Sovetskaya voyennaya nauka segodnya ('Soviet Military science Today'), Kommunist (K), 7/1976, pp. 38-47; Marshal N Ogarkov, 'Voyennaya nauka i zashchita sotsialisticheskogo otechestva' ('Military science and the Defence of the Socialist Homeland'), K, 7/1978, pp. 110-121; Ye Kuznetsov, F Shirokov, 'Naukoyemkiye proizvodstva i konversiya oboronnoy promyshlennosti' ('High-technology Production and the Conversion of Defence Industry'), K, 10/1989, pp. 15-22.

98. A A Kokoshin, Army Gen. V N Lobov, 'Predvideniye (General Svechin ob evolyutsii voyennogo iskusstva)', ('Foresight (General Svechin on the Evolution of Military Art)'), Znamya, February 1990, pp. 170-82. The article comprises three main sections: 1. Politics and Military Strategy (pp. 171-3); 2. The Character of Future War (pp. 173-77); 3. Attack and Defence (pp. 177-82). The conclusions about the changes in the world situation are similar to those in Kokoshin's article in International Affairs, see note 96.

99. Russkiye vedomosti. This included regular, daily reports on World war I. An important analysis is S M-skiy (a pseudonym), 'Uroki voyny' ('Lessons of the War'), 1 January, 1915, pp. 3-4, analysing the first five months (see part 3).

100. For example, Yazov's article on the 'new' Military doctrine in Pravda 27 July, 1987, p 5, printed in KZ the following day. See note 21. Pravda is obviously a forum for politically prominent future war issues such as war in space: S L Sokolov's article 'To Preserve what has been achieved in the Sphere of Strategic Arms Limitation', Pravda 6 November, 1985, p. 4. In 1965, analysing the nature of a future (nuclear)war, Pravda warned that the destruction would be so great that this would not speed up the transition to socialism but throw mankind a long way back: G Glezerman, 'The Great Significance of Leninist

ideas on the struggle for Democracy and Socialism', Pravda, 21 January 1965.

101. For example, V Glushkov and G Dobrov, article on forecasting, Izvestiya 10 July, 1968; Marshal Ogarkov 'Pobeda i sovremennost' ('Victory and the Present'), Izvestiya 9 May 1983; V Litovkin, Defence Correspondent, 'Sekrety bez sekretov' ('Secrets without secrets') (The structure of the USSR Armed Forces, a self conscious piece of glasnost'), Izvestiya 21 February 1990, p. 6.

102. 'Ready for action', Soviet Weekly 1 February 1990, p. 5. The red berets were only seen on individuals, in Azerbaijan, suggesting they were acting as advisers.

103. V K Triandafillov, Kharakter operatsiy sovremennykh armiy (Character of the Operations of Modern Armies), (1st ed., Gosizdat, Moscow, 1929, 2nd ed., Moscow, 1932, 3rd ed., Moscow, 1936). This is cited in the 1933 SVE article on Future War (vol. 2, p. 844) as 'A great, [exceptionally] fertile work on the problem of future war'. See also Marshal M Zakharov, 'O teorii glubokoy operatsii' ('On the Theory of the Deep Operation'), VI Zh 10/1970, pp. 10-20. Zakharov regards development of the theory of the Deep Operation as virtually synonymous with establishing the character of future war. The role of the M V Frunze Military Academy, in particular its 'Operational Faculty' (Operativny fakul'tet) and 'The RKKA General Staff and in particular its Operational Directorate' (Operativnoye upravleniye) are stressed (pp. 12-13, 17).

104. M M Kir'yan, Istoriya otechyestvennoy voyenno-entsiklopedicheskoy literatury (History of National Military-Encyclopaedic Literature), (Nauka, Moscow, 1980) and Problemy voyennoy istorii v sovetskikh nauchno-spravochnykh izdaniyakh, (Problems of Military History in Soviet Scientific-Reference Publications), (Nauka, Moscow, 1985).

105. Entsiklopediya voyennykh i morskikh nauk, (8 Vols., St Petersburg, 1883-97). See part 2 for its definitions of Military Science, etc.

106. Voyenny entsiklopedicheskiy slovar'. See note 46.

107. Bol'shaya Sovetskaya Entsiklopediya. The 1928 Volume 12 is particularly useful: see part 2 for definitions of Military Science, etc., and also the article by S Kreshkov and M Petrov on War games, Cols. 168-9.

108. Edited by L G Beskrovny. see note 33.

109. Voprosi strategii i operativnogo iskusstva v sovetskikh voyennykh trudakh (1917-1940 gg), (Problems of

Strategy and Operational Art in Soviet Military Writings (1917-1940), (Voenizdat, Moscow, 1965) (6,500 copies. 768 pp.)

110. M N Tukhachevskiy, Izbrannye proizvedeniya (Collected Works), (2 Vols, Voenizdat, Moscow, 1964).

111. Problemy Revolyutsii v voyennom dele. Sbornik statey (Problems of the Revolution in Military affairs. A Collection of Articles), (Voenizdat, Moscow, 1965) (16,000 copies). Signed to Press 21 October 1964.

112. Sovetskiye vooruzhënnnye sily. Istoriya stroitel'stva. (The Soviet Armed Forces. A History of their Organization), (Voenizdat, Moscow, 1978), for example p. 185 on technological development and probable enemies in the 1930s and pp. 406-20 on the Revolution in Military Affairs.

113. O A Losik, Stroitel'stva i boyevoye primeneniye sovetskikh tankovykh voysk v gody Velikoy Otechestvennoy voyny (The Composition and Combat Employment of Soviet Armoured Forces in the Great Patriotic war) (Voenizdat, Moscow, 1979).

114. I M Anan'ev, Tankovye armii v nastuplenii. Po opytu Velikoy Otechestvennoy voyny, 1941-45 gg. (Tank Armies in the Offensive. According to the Experience of the Great Patriotic war 1941-45), (Voenizdat, Moscow, 1988).

115. See note 62.

116. See for example Melikov's book Strategicheskoye razvërtyvaniye and the related discussion S Krasil'nikov, 'Strategicheskoye razvërtyvaniye', KZ 24 September, 1940, p. 3 and A Girov, 'K voprosam strategicheskogo razvërtivaniya' ('On Questions of Strategic Deployment'), KZ 23 October 1940, p. 3. Also divisional commissar M Galaktionov, Tempy operatsii (The Tempos of Operations [note plural]), (2 Vols., Voenizdat, Moscow, 1937). Galaktionov (an appropriately futuristic name) pays much attention to the crystallisation of a solid front in 1914, and to the need for motor-mechanized forces to keep the enemy off balance in the opening phases of an operation, preventing this recurring.

117. See 'Rech' tovarishcha M N Tukhachevskiy' ('Comrade M N Tukhachevskiy's Speech') (as Deputy People's Commissar for Defence), KZ 16 January 1936 pp. 1-2, Part I, 'The situation in East and West' and Part II, 'Reinforcing the Power of the Red Army'.

118. For example, Address to Graduates from the Red Army Academy, Stalin 3 Speeches, (Martin Lawrence, London,

1935), pp. 4-1, and J V Stalin Replies to 'Pravda' Correspondent on the Atomic Weapon, from Pravda, 6 October 1951, (Reprinted by Soviet News, London, 1951)

119. 'Comrade Zhukov's Speech', Record of the Speech at the 20th Congress of the CPSU, (Voyenizdat, Moscow, 1956), also reproduced in the Record of the Ninth Session, pp. 475-483.

120. See in particular Brezhnev's Tula speech, notes 16, 56, and also L I Brezhnev, Na strazhe mira i sotsializma (On Guard for Peace and Socialism) (Politizdat, Moscow, 1979), pp. 491-92. On the significance of the speech, which arguably marks the beginning of the possibly all-conventional Strategic Offensive era, see David Holloway, The Soviet Union and the Arms Race, (Yale University Press, New Haven, 1983), p. 48.

121. For example, Gorbachev's address to the Plenum of the Central Committee of the Communist Party, 15 October 1985, 'O proyektakh novoy redaktsii Programmy KPSS, izmeneniy v Ustave KPSS, Osnovnykh napravleniy ekonomicheskogo i sotsial'nogo razvitiya SSSR na 1986-1990 gody i na period do 2000 goda' ('On the Projects in the New Edition of the CPSU Programme, Changes in CPSU Regulations, and the Social development of the USSR for 1986-1990 and the period to 2000'), and 'Doklad General'nogo sekretarya TsK KPSS M S Gorbacheva' ('Speech by General Secretary Gorbachev'), KVS 21/1985, pp. 3-13. Two speeches in January and February 1986 mark a clear declaration of the current 'new thinking' in political-military affairs: 'Zayavleniye General'nogo sekretarya TsK KPSS M S Gorbacheva' ('Declaration of the General secretary of the USSR Communist Party M S Gorbachev'), KZ, 16 January 1986, p. 1, and in Pravda the same day pp. 1-2; 'Prodolzheniye doklada tovarishcha Gorbacheva M S' ('Continuation of Comrade M S Gorbachev's Speech'), Pravda 26 February 1986, p. 8 (see part 4).

122. 'S pozitsii oboronitel'noy doktriny' ('From the position of a Defensive Doctrine'), meeting of the [then] Col.-Gen. M A Moiseyev with Members of the USSR Communist Party on the General Staff, 8 February, 1989, KZ, 10 February 1989, pp. 1-2. Also Col. A I Alistratov Moiseyev's remarks in 'nauchno-prakticheskaya konferentsiya General'nogo shtaba' ('Scientific and Practical Conference of the General Staff', [November 1989] VM 2/1990, pp. 78-80.

123. On FSRs in general (to PU-29) see M Gretsov, 'Iz istorii polevykh ustavov Krasnoy Armii' ('From the History of the Field Service Regulations of the Red Army'), VIZh

1/1964, pp. 99-102. PU-18 included 'the latest facts from experience of the use of artillery, engineers and even armour in World War I' (p. 99). Part 1 was, however, devoted to 'Manoeuvre War'. It owed much to Ustav polevoy sluzhby (FSR), 27 April, 1912. Author used a copy printed by Yurist, Moscow, 1916. On earlier FSRs, see L G Beskrovny, Ocherki po istochnikovedeniyu voyennoy isorii Rossii (Sketches on the Source Material of Russian Military History), (Nauka, Moscow, 1957), esp. pp. 348-65.

124. Polevoy ustav RKKA (1929) (PU-29), (Gosvoenizdat, Moscow, 1933) (184 pp., 50,000 copies); Polevoy Ustav RKKA 1936 (PU-36), (Gosvoenizdat, Moscow, 1937) (215 pp., 90,000 copies). See also the earlier infantry regulations, Boevaya sluzhba pekhoty (Infantry Field Service), (Higher Military editorial soviet, Moscow, 1924), (176 pp. plus 12 diagrams) (25,000 copies), and Boevoy ustav pekhoty (Infantry Field Regulations), Part II, (Voyenny vestnik Press, Moscow, 1927) (304 pp. and 11 diagrams) (120,000 copies)..

125. See the article on FSRs in SVE, Vol. 6 (1978), pp. 405-06 which, significantly, was authored by M M Kir'yan

126. The last FSR specifically mentioned in SVE is PU-43 (Vol. 6, p. 406). Kir'yan does however allude to FSRs 'of the 1950s and 1960s'.

127. SVE, Vol.6, p. 406.

128. Lt Gen V G Reznichenko, et al., Taktika (Tactics), (Voenizdat, Moscow, 1966, 1984, 1987).

129. Taktika, 1987 edition. New section on precision weapons, pp. 23-29; p. 206, expansion of artillery preferred targets to include recently developed (improved conventional) weapons; p. 242 suppression of air defence, helicopters; new conclusion, pp. 495-96.

130. 'O novykh zadachakh "Morskogo Sbornika"' ('On the new Mission of Morskoy Sbornik'), MSb 1-2/ 1922, pp. 1-5, this p. 2.

131. Admiral of the Fleet of the Soviet Union Sergey M Gorshkov, Morskaya moshch' gosudarstva, (The Sea Power of the State), (Voenizdat, Moscow, 1976).

132. Viktor Novitskiy was editor of the important Tsarist Military Encyclopedia (often cited under Sytin, who was the publisher), Voyennaya entsiklopediya (Military Encyclopedia) (VE), (18 Vols., St Petersburg/Petrograd, 1911-15, publication discontinued at letter P). His work, Teoriya mobilizatsiya (The Theory of Mobilisation) was serialized in MSb, 4/1910, pp. 35-53,

5/1910, pp. 15-37, 6/1910, pp. 47-60; 7/1910, pp. 57-66; 8/1910, pp. 21-28; 9/1910, pp. 15-27; 10/1910, pp. 13-23. There is also an article translated by 'V.N.' from the Italian Rivista Marittima on 'Morskaya strategicheskaya geografiya' ('Naval Strategic Geography'), possibly translated by Novitskiy, in MSb 12/1910, pp. 53-71.

133. N Klado, 'Etyudi po strategii', MSb 1/1913, pp. 53-77, 2/1913, pp. 91-116, 5/1913, 61-80; 6/1913, pp. 67-94; 8/1913, pp. 59-80; 11/1913, pp. 33-60; 12/1913, pp. 33-62; 1/1914, pp. 55-81; 2/1914, pp. 65-88; 4/1914, pp. 17-37; 5/1914 pp. 59-90; 10/1914, pp. 1-34; 11/1914, pp. 1-32. In MSb 6/1914, just before the outbreak of World war I, he published the first part of 'O teorii voyennoy nauki' ('On the Theory of Military Science'), pp. 55-121, continued in 7/1914, pp. 135-86 and 8/1914, pp. 57-104. The exchange with Neznamov occurred in MSb 3/1914: A Neznamov 'V zashchitu g. Shlikhtinga' ('In Defence of Schlichting' (A German Strategist: see chapter 3), pp. 65-70; Klado 'Po povodu "Zashchity g Shlikhtinga"' ('With Reference to "The Defence of Schlichting"'), pp. 71-81.

134. B B Zherve, 'Morskiye ocherki' ('Naval Sketches'), MSb 1-2/1922, pp. 7-27. On p. 6 the author justified his choice of the word 'sketches' by saying that these were ideas, in no way reflecting official policy, thus shielding himself against the risk of Bolshevik opprobrium.

135. Admiral of the Fleet of the Soviet Union S G Gorshkov, ed., with N P V'yunenkov, B N Makeyev and V D Skugarëv, 'Voyenno-morskoy flot: rol', perspektivy, razvitiya, ispol'zovaniye', (Voyenizdat, Moscow, 1988). V'yunenkov was a historian at the Naval Academy, Makeyev the tactician and Skugarev the expert on prediction. The book was well analysed in Theodore A Neely and Captain Steve F Kime, 'Perestroika, Doctrinal Change and the Soviet Navy', Strategic Review, Fall, 1988, pp. 45-54.

136. Captain V D Skugarëv, 'Prognozirovaniye i razvitiye voenno-morskikh flotov' ('Forecasting and the Development of Navies'), Morskoy Sbornik (Naval Review), 5/1972, pp. 33-39.

137. VE(12911-15), Vol. 8, p. 333, Glavny morskoy shtab; Vol. 16, pp. 430-31, Morskoy general'ny shtab.

138. General N Golovin, in collaboration with Admiral A D Bubnov, Introduction by Harold Williams, 'The Problem of the Pacific in the Twentieth century', (Gylendal, London, 1922). Golovin was Professor of tactics at the Military Academy in St Petersburg for many years, and in 1916 was Chief of Staff of the 7th Army in Brusilov's offensive. Bubnov participated in the Russo-Japanese war and was

Chief of the Naval Section of the Staff of the Supreme Commander (the Tsar) during World War I.

139. B Dolivo-Dorbovol'skiy. Tikhookeanskaya problema. S vstupiditel'noy statey M Pavlovicha 'Bor'ba za Tikhiy Okean' (The Pacific Problem. With an Introductory Article by M Pavlovich, 'The Struggle for the Pacific Ocean'), (Higher Military- Editorial Soviet, Moscow, 1924).

140. Ibid., p. 209 'S. samogo nachala voyny, yapontsy pochtı beznakazanno mogut zakhvatit' Filippiny'.

141. The recent literature on the Theatre Strategic Operation (TSO)- a western term - is vast. During the mid 1980s it was envisaged that such a strategic operation would take place within a Theatre of Military Operations or Theatre of Strategic Military Action as it is sometimes translated (Russian Teatr voyennykh deystviy -TVD). The term TVD has been in continuous use in Russian since Jomini. Neyelov (Otdel II, 1847), for example discusses (pp. 24-27), 'Teatr voyny, teatr voyennykh deystviy i zona deystviy' ('The Theatre of War, TVD, Zone of Action'). A theatre of War is bounded by mountains and seas: a TVD (using Jomini's definition) is an area in which one army operates with one objective. A zone of operations is an area in which several armies converge from several directions on one objective. The term TVD then crops up constantly in works on future war in the 19th and 20th centuries. In a future war seen from the viewpoint of 1988, operations would take place in continental (kontinental'nykh) and maritime and oceanic (morskiye i okeanskiye) TVD - see, for example, Gorshkov, ed., The Navy, pp. 24, 27. Within the Western (continental)TVD, it was believed that the TSO would comprise up to four overlapping 'Strategic operations': an Aerospace Operation, an Anti-Aerospace Operation, a Naval Operation and a Theatre Land Operation. See Bellamy, The Future of Land Warfare pp. 110-113.

142. Lt Gen S M Shtemenko, General'ny Shtab v gody voyny (The General Staff in the War Years), (Voyennye memuary series, Voenizdat, Moscow, 1968). Pp. 6-7 are informative on the role of the GS Academy (which separated from the Frunze in 1936) and the link between its 'Think Tank' work and strategic planning. I M Maisky, 'V Londone' ('In London'), in N I Koritskiy, ed., Marshal Tukhachevskiy: Vospominaniya družey i soratnikov (Marshal Tukhachevskiy: Memoirs of Friends and Comrades-in-Arms)(Voenizdat, Moscow, 1965)

143. Maisky, in Koritskiy, p. 230. 'Tukhachevskiy and Dill recalled various precedents from military history and discussed what would have happened if the commander in

this or that battle had airborne [parachute] forces at his disposal, what changes this innovation would make on modern tactics and strategy'.

144. On Clarke, see note 40.

145. See Clarke, 'The First Forecast of the Future', Futures, June, 1969 ; Jules Verne and the Vision of the Future', Futures September, 1969, etc.

146. Michael Salewski, Zeitgeist und Zeitmaschine: Science Fiction und geschichte (The Spirit of the Time and the Time Machine: Science Fiction and History), (DTV, Munich, 1986), p. 153.

147. Ibid., pp. 170-73. Bulwer-Lytton's The Coming Race (published anonymously by Blackwood in 1871) features Vril, a power akin to nuclear energy. Wells' The World Set Free mentions atomic bombs. See Note 9 and Clarke, Voices Prophesying War.

148. Steven M Shaker and Alan R Wise, War without Men: Robots on the Future Battlefield, (Pergamon- Brassey's Future Warfare Series, Vol. II, Pergamon-Brassey's Inc., McLean, Va., 1988), pp. 13-15.

149. A Tsiolkovskiy, The Call of the Cosmos, (A Translation of Puti k zvëzdam), (Foreign Languages Publishing House, Moscow, 1960). This is the story in 'On the Moon', written 1887, published 1893.

150. Velemir Khlebnikov, Bitvy 1915-1917 gg. Novoye ucheniye voyny (The Battles of 1915-1917. A New Study of War), (1915), Introduction by A Kruchenykh (not paginated). Kruchenykh considered Khlebnikov's 1908 poem Noch' v Galitsii (A Night in Galicia) to be a prophecy of the Galician battles at the opening of World war I.

151. See note 40. Clarke noted that although tactical nuclear war and large scale non-nuclear war were increasingly envisaged from 1963, writers had not as yet begun to describe the more 'limited' warfare that might develop. The latter only really began with Sir John Hackett's The Third World War. A Future History (Sidgwick and Jackson, London, 1978), and Shelford Bidwell et al., World War III: A Military projection founded on Today's Facts [conforming perfectly to the Soviet definition of a prognoz], (Hamlyn, London, 1979). General Hackett has confirmed that his writing on a Third World war was influenced by a wish to contribute to development of public awareness of a need to strengthen NATO, and that he had well formed views on the importance of fiction in the development of policy; letter from General Sir John Hackett to the author, 3 February, 1989.

Since then a number of interesting works have appeared around the world in the fictional or semi-

fictional genre: Ravi Rikhye, The Fourth Round. Indo-Pak War of 1984, (ABC Publishing House, New Delhi, 1982); O'Heffernan, Lovins and Lovins, The First Nuclear World War, (Hutchinson, London, 1983).

152. N G Chernyshevskiy, Chto delat'? Rasskazov o novykh lyudyakh (What is to be Done? Tales of New People), (Introductory essay by B Ryurikova, Khudozhestvennaya Literatura, Leningrad, 1969). The novel was written in 1862-63 and first published in 1863, when Chernyshevskiy was imprisoned in the Petropavlovskaya fortress.

153. Col N Makeyev, N G Chernyshevskiy - Redaktor "Voyennogo Sbornika", (N G Chernyshevskiy - Editor of "Voyenny Sbornik") (Voenizdat, Moscow, 1950). The first edition appeared in May, 1858, under Chernyshevskiy's editorship (Makeyev, pp. 57-58). Chernyshevskiy was, however, obliged to leave the journal at the end of the year (p. 99).

154. See note 79.

155. Vice Admiral A Belomor, Rokovaya voyna 18?? goda, (Otdeleniye ottiski iz zhurnala 'Russkoye sudokhodstvo'), (...Extracts from the Journal Russian Seaborne Trade), (R Golika Press, St Petersburg, 1889) (115 pp. Cleared by the censor 6 April 1889).

156. 'A-K', Kreyser "Russkaya nadezhda" (The Cruiser "Russian Hope"), (S S Lyubavin, St Petersburg, 1887), translated as Anon., (-K) The 'Russia's Hope', or Britannia no longer rules the waves. Showing how the Muscovite Bear got at the British Whale. Translated from the Original Russian by Charles James Cooke, with a preface by William Beatty-Kingston, Chapman & Hall, London, 1888), this, preface, p. ii.

157. See note 69, and part 3.

158. Aleksey Tolstoy, Giperboloid inzhenera Garina (Sovetskiy pisatel', Moscow, 1939), trans. George Hanna as The Garin Death-Ray, (Foreign Languages Publishing house, Moscow, 1955). All editions indicate that the work was written in 1926-27. The similarity between Garin's 'Hyperboloid and the newly discovered (1957) laser was explicitly noted in the article on Tolstoy's science-fiction work appended to the 1962 school edition of Hyperboloid... and Delita (1922), (Vologda Book Publishers, 1962), p. 444. See parts 3 and 4.

159. Irina Grekova (Irina Grekova is E S Ventssel's pen name) 'Na Ispytaniyakh', Novy Mir, No. 7, (July) 1967, pp. 14-110.

160. An obvious recent example of a doctrinal work is Milovidov et al. , Voyenno teoreticheskoye naslediyе V I Lenina i problemy sovremennoy voyny. On works concerned with forecasting see note 172.

161. In Particular, Engels' 7 January 1888 letter to Sorge cited in Karl Marx and Friedrich Engels' Correspondence, ed. Torr, p. 455. This is cited, for example, in extenso in Cherednichenko 'Voyenno-politicheskoye prognozirovaniye...' (KVS 20/1970), p. 24.

162. Lenin is cited, for example, 14 times in the first 37 pages of Maj Gen V Konoplëv, Nauchnoye predvideniye v voyennom dele (Scientific Foresight in Military Affairs), (Voenizdat, Moscow, 1974), signed to press on 6 February 1974 , Marx and Engels' Collected works are cited 9 times. Of these citations, six of those from Lenin and six from Marx and Engels relate specifically to forecasting. See also Peter Vigor, The Soviet View of war, Peace and Neutrality, (Routledge and Kegan Paul, London, 1975), pp 9-10.

163. Georges Haupt and Jean-Jacques Marie, Makers of the Russian Revolution: Biographies of Bolshevik Leaders (Cornell University Press, Ithaca, 1974), pp. 286-292.

164. BSE, Vol. 25, (Sovetskaya entsiklopediya 1976), pp. 552-53.

165. Haupt and Marie, pp. 286-262.

166. A A Bogdanov. Vseobshchaya organizatsionnaya nauka (Tektologiya) (The Universal Organizational Science. Tectology), (Semënov, Moscow, 1912), p. 1.

167. Timiryazev cited in Konoplëv, Nauchnoye predvideniye, p. 3; BSE Vol. 25, p. 552.

168. Jacob W. Kipp, From Foresight to Forecasting: the Russian and Soviet Military Experience (Stratech Studies, Center for Strategic Technology, Texas A & M University, College Station, April, 1988), p. 96.

169. Konoplëv, Nauchnoye predvideniye... pp. 29-30.

170. Randolph, 'Social and Technological Forecasting in the Soviet Union', p. 494, note 5.

171. See Kipp, From Foresight to Forecasting..., pp. 177-85, covering the years 1952-65.

172. See for example Konoplëv, Nauchnoye predvideniye... (1966), I I Anureyev and A E Tatarchenko, Primeneniye matematicheskikh metodov v voyennom dele (The

Use of Mathematical Methods in Military Affairs)(Voyenizdat, Moscow, 1967) and V Trofimov and G Kadomtsev, 'Metodologiya nauchnogo predvideniya' ('Methodology of Scientific Foresight'), VM, 2/1967, pp. 30-31.

173. V Sokolovskiy and M Cherednichenko, 'Voyennaya strategiya i yeyë problemy' ('Military Strategy and its Problems', VM 10/1968, p. 37.

174. Ibid., p. 40.

175. See notes 136, 162, and, on Bestuzhev-Lada, part 2.

176. Dr Manfred Wörner, Secretary General of NATO, press conference, NATO HQ, Brussels, 23 May, 1990, attended by the author. Reported in the Independent, 24 May 1990, p. 8.

177. The prime sources are: Maj Wojciech Michalak, 'Lotnictwo w działaniach rajdowo-manewrowych wojsk lądowych' ('Aviation in Raid-manoeuvre Operations of Ground Forces'), Przegląd Wojsk Lotniczych i Wojsk Obrony Powietrznej Kraju (Air and Air Defence Force Review) (PWL i WOPK), 2(February)/ 1982, pp. 5-9; Col Aleksander Musiał, 'Charakter i znaczenie operacji powietrznych we współczesnych działaniach wojennych' ('The Character and Significance of Air Operations in Modern Warfare'), PWL i WOPK, 3(March) 1982, pp. 10-13; Musiał, Rola lotnictwa uderzeniowego w zabezpieczeniu Działań Desantów Morskich ('The Role of Strike Aviation in Support of Sea Assault Landings'), PWL i WOPK, 5(May)/ 1982, pp. 11-14; Col Witold Pokruszyński, 'Operacja przeciwpowietrzna Wojsk OPK' ('An Anti-Air Operation by the Strategic Air Defence Forces'), PWL i WOPK, 5(May)/ 1982, pp. 5-9; Col Ryszard Konopka, 'Wprowadzenie oddziału Wydzielonego do walki' ('The Commitment of Forward Detachments to Battle', Przegląd Wojsk Lądowych (Ground Forces' Review), 5/1982, pp. 21-24; Musiał, Działania Bojowe Lotnictwa na Korzyść Operacyjnych Grup Manewrowych ('Air Combat Operations on Behalf of OMGs'), PWL i WOPK 7-8(July -August)/ 1982, pp. 9-14; 'Operacyjne grupy manewrowe' (OMGs), 'Myśl wojskowa' ('Military Thought') section, Zołnierz Wolności (Soldier of Freedom) (ZW), 26 October, 1982, p. 4. The revelations about OMGs are documented in Christopher Bellamy, The Evolution of Modern Land Warfare: Theory and Practice, (Routledge, London and New York, 1990), pp. 121-23.

178. Dr Władysław Bortnowski, 'Z Postępów Tradycji Oręża Polskiego', Wojskowy Przegląd Historyczny (WPH), 4/1966, pp. 276-281.

179. Brig Gen Dr Franciszek Skibiński, 'Z historii Doktryn Wojennych', WPH 4/1970, pp. 249-78. This includes

references to André Maurois, Gamelin, de Gaulle, Fuller, Liddell Hart, Douhet and Mitchell as well as the Russians Mikhnevich and Neznamov. It may of course be that Skibiński's approach is particularly eclectic.

180. Skibiński, 'O Sztuce Operacyjnej' ('On Operational Art'), WPH 1/1971, pp. 299-314. There are references to Beaufre and Patton as well as Grechko and Shtemenko.

181. Skibiński, 'Z Rozważań o Strategii' ('Some Reflexions on Strategy'), WPH 3/1972, pp. 218-37.

182. Ibid. The second reference is to the early 19th century theorist N V Medem (see part 3). There is also reference to his contemporary P A Yazykov, as well as Clausewitz, Moltke, Schlieffen, Beaufre and Liddell Hart.

183. Gen Bolesław Chocha, Col Dr Antoni Karpiński, 'Akademia Sztabu Generalnego im Gen Broni K Swierczewskiego Kuźnią Kadr Dowódczych o Ośrodkiem Naukowo-Badawczym Sił Zbrojnych' ('The K Swierczewski General Staff Academy: A Forge of Command Staffs and a Centre for Scientific Research on the Armed Forces'), WPH 2/1974, pp. 201-42, which includes a bibliography of publications on the Academy. Diagram of contacts on p. 229.

184. British Intelligence Files in the Public Record Office, Kew, particularly for the inter war period: Directorate of Military operations and Intelligence Files, WO/106, WO/208 (Military Intelligence); for example, WO/208/1758 including items from 1940 and 1941 on 'The Strategy of the Red Army in a War against Germany' and 'Will Russia Fight';, CAB 56 (Joint Intelligence Committee). The General Intelligence series WO/33 is useful on earlier times, for example WO/33/419, War Office, General Staff, Military Resources of the Russian Empire, 1907.

185. US Military Intelligence Reports, 1919-41 (Microfilm, National Archives and Records Service).

186. HQ USAF Air Intelligence Reports, 100-13/9-100 dated 4 August. 1948 (15 June Report), p. 12, (artillery style barrage) and the illustration with Pokrovskiy's 1944 article 'Primeneniye dal'noboynykh raket' ('The Use of Long range Rockets'), Tekhnika molodezhi (Technology for Youth), (Moscow), 4(April)/1944, pp. 7-8.

187. See note 8.

188. See Lieutenant General Sir Giffard Martel, The Russian Outlook, (Michael Joseph, London, 1947) esp. pp. 14-33, also Martel's confidential report 'Russian

Manoeuvres, September 6th-11th), in the Liddell Hart Centre for Military Archives, King's College, London (LHCMA), 1/492.

189. USAF Military Intelligence Reports, 66/2 Mobilisation.

190. R L Garthoff, The Soviet Image of Future War, (Public Affairs Press, Washington, 1959). The three Soviet works directly translated are Colonel I Baz, 'Soviet Military Science on the Character of Contemporary War' (Voyenny vestnik, 6/1958); Colonel I Korotkov, 'On the fundamental Factors which determine the Course and Outcome of Wars' (Sovetskaya aviatsiya, 12 August, 1958); Colonel P Sodotov, 'The Creative Character of Soviet Military science' (Sovetskiy flot, 11 December, 1959).

191. Arnold Horelick, Some Soviet Views on the Nature of a Future War and the Factors determining its Course and Outcome, (Rand Corporation, Santa Monica, 1958). This includes, inter alia, the same article by I S Baz as Garthoff's book.

192. See note 168.

193. Julian Lider, Military Theory. Concept, Structure, Problems (Swedish Studies in international relations, Gower Press, Aldershot, 1983). Ch. 3, pp. 95-139 which includes classifications of types of war (pp. 113-20); ch. 6, pp. 261-92; ch. 9, pp. 335-40.

194. Ibid., p. 336, citing L Belousov, 'Konferentsiya o sovetskoy voyennoy doktrine' ('Conference on Soviet Military doctrine'), VIZh 10/1963.

195. Lider, p. 340.

196. R L Garthoff, How Russia Makes War: Soviet Military Doctrine, (George Allen and Unwin, London, 1954).

197. Ibid., p. 61. The 'Academy of Artillery Sciences' was also in operation at this time, developing rockets and nuclear weapons. Developing military technology, operational art and tactics (but not strategy) were legitimate activities, and it is probable that the 'Bureau for the Study of Modern War' concentrated on technical questions, thus avoiding Stalin's opprobrium.

198. Harriet Fast Scott and William F Scott, The Armed Forces of the USSR, (1st Edition, Westview, Boulder, 1979; 2nd and 3rd Editions, Westview, Boulder and Arms and Armour Press, London, 1981, 1984). The 1979 Edition lists nine references to 'future war' (p. 427).

199. V D Sokolovskiy, Voyennaya Strategiya, (1962, 1963, 1968), translated by Harriet Fast Scott as Soviet Military Strategy (Macdonald and Jane's, London, 1975). This lists fifty six references to 'future war' (pp. 480-81).
200. Scott and Scott, The Armed Forces...(1979), pp. 43-44.
201. Ibid., pp. 73, 285.
202. Ibid., pp. 41-46 (nuclear rocket war), 285-86 (Tukhachevskiy, Uborevich).
203. Peter H Vigor, The Soviet View of War, Peace and Neutrality, (Routledge and Kegan Paul, London, 1975).
204. Ibid., p. 21.
205. Ibid., influence of technology on war, pp. 97-98, nuclear war, pp. 136-39, emergence of non-nuclear option, p. 159. In 1975, Vigor unfortunately fell into the trap awaiting every would be predictor of future war, 'the Soviet forces are obviously capable of winning a swift and convincing victory over, for example, Afghanistan' (pp. 8-9).
206. Derek A Leebaert, ed., Soviet Military Thinking (George Allen and Unwin, London, 1981).
207. See Lawrence Freedman 'Start of the Peace Offensive', The Independent, 18 November, 1988, p. 19. Freedman believes that 'Reasonable Sufficiency' was 'developed by the new breed of civilian defence analysts in Moscow and embraced by Mr Gorbachev', (col. 4), but it is unclear what his sources are, if any, for this assertion. 'Reasonable sufficiency' makes a lot of sense to generals as well, going back to Kuropatkin in 1900 (see note 43).
208. Leebaert, p. 13.
209. M N Tukhachevskiy, Novye voprosy voyny (New Questions of War- unpublished draft of a book). Excerpts published in VIZh, 2/1962, pp. 62-77. This on p. 65, '....on the contrary, being standardised with the preacetime use of the very same machines, it [Aviamotomekhanizatsiya] creates preconditions for their effective massed use in war'.
210. Leebaert, p. 15.
211. Ibid.

212. See note 21 and part 2, note 79, esp. Yazov, 27 July 1987 article and Gareyev speech to RUSI.

213. Garthoff's introduction to Pokrovskiy, Science and Technology... p. ix. See in particular the original Nauka i Tekhnika...p. 12.

214. David Holloway, 'Doctrine and Technology in Soviet Armaments Policy', in Leebaert, ed., Soviet Military Thinking, pp. 259-91; see also his 'The Soviet Style of Military R&D [Research and Development]', in F A Long and Judith Reppy, ed., The Genesis of New Weapons: Decision Making for Military R&D, (Pergamon, New York). On the Soviet perceived need to stress the influence on Doctrine see for example, Kir'yan, Voyenno-tekhicheskiy progress... esp. pp. 6-7, 10, and stress on their mutual interdependence (p. 334).

215. For example, Donald MacKenzie, The Soviet Union and Strategic Missile Guidance, International Security, Fall, 1988 (Vol. 13, No.2), pp. 5-53. As MacKenzie points out, an increase in accuracy from the modest requirements for retaliatory destruction of cities to those capable of hitting missiles in their silos has contributed to a massive shift in strategy.

216. I I Rostunov, Russkiy front pervoy mirovoy voyny (The Russian Front in the First World War), (Nauka, Moscow, 1976), Ch. 2, 'Planirovaniye voyny' ('War Planning'), pp. 60-116.

217. D C B Lieven, Russia and the Origins of the First World War, (Macmillan, London, 1987), pp. 76-81.

218. See Hoover Library on War, Revolution and Peace, Publication No. 14, V I Gurko, Features and Figures of the Past (Stanford and Oxford University Press, 1939), pp. 415-16, p. 668, note 18. A translation of his memorandum of February, 1914 is in F A Golder, ed., Documents of Russian History, 1914-1917, (New York, 1927), pp. 3-23.

219. E L Raymond, Soviet Preparations for Total War, 1925-51, (Ph.D, University of Michigan, 1952) and S M Tupper, The Red Army and Soviet Defence Industry, 1934-41, (Ph. D, University of Birmingham, 1981-82).

220. F M Laney, Jr., The Military Implementation of the Franco-Russian Alliance, 1890-1914 (Ph.D, University of Virginia, undated, ca. 1977).

221. S E Speed, NATO Defence and the Potential Soviet Threat: an Analysis of a Possible Future War in Northern Norway, (M.Phil, University of Manchester, 1984). This

looks at a possible element of 'future war' from a NATO rather than a Soviet perspective.

222. Kirke Report: War Office (WO) 32/13087, Report of the Committee on the Lessons of the Great War (A3629), October, 1932. Soviet commentators candidly admitted that the circumstances of the Civil War might have been special. Batorskiy, 'Neskol'ko mysley, vliyayushchikh na formy budushchikh voyn', RiV 3/1921, p. 67.

223. Kenneth Macksey, Armoured Crusader: Major General Sir Percy Hobart (Hutchinson, London, 1967), pp. 137-44.

224. Liddell Hart's view in October 1937, expressed in Liddell Hart, Thoughts on War, (Faber, London, 1964), p. 125.

225. Though born a Czech, Miksche came to western Europe and the US before World War II. He served with the French Foreign Legion and taught at the Portuguese Staff College. His first published work was on 'Blitzkrieg'; see Attack! A Study of Blitzkrieg Tactics (Random House, New York, 1942). He then wrote Paratroops: The History, Organization and Use of Airborne Formations (Faber and Faber, London, 1943). This included a remarkable prediction of the precise location of the Normandy landings and the use of airborne troops to protect the flanks (pp. maps on pp. 64, 98). Fortunately for the western allies, the Germans chose to regard this as a purely hypothetical example: an example of the potential value of scanning the open military press for 'hard' intelligence! Other future war works were, (with E Combaux), War Between Continents, (Faber and Faber, London, 1948), Atomic Weapons and Armies (Faber and Faber, London, 1955). Unfortunately, he had died before the author was able to interview him.

226. Christopher Duffy, Russia's Military Way to the West. Origins and Nature of Russian Military Power, 1700-1800, (Routledge and Kegan Paul, London, 1981), pp. 240-41.

227. Para. 2 of Truppenführung, cited in Miksche, Paratroops..., p. 7.

228. Miksche, Paratroops..., p. 9.

229. A A Bogdanov, Tektologiya: Vseobshchaya organizatsionnaya nauka, Chasti I i II, zanovo pererabotannye i dopolnennye i Chast' III, (Tectology: the Universal Organizing Science, Parts I and II, newly re-worked and augmented, and Part III), (Z I Grzhebin Press, Berlin, 'Petersburg' [sic.], Moscow, 1922) (521 pp.).

230. MSb 5-6/1919 (published Petrograd 20 June 1919) was the last to bear the Imperial Russian Navy flags on the cover, some 20 months after the October Revolution. The following issue revealed a change of editor: A Zhitkov, in place of P Novopashenny. The style of the journal continued otherwise unchanged, although at the beginning of 1920 it acquired a Political Commissar for the first time.

231. 'O tselyakh i kharaktere zhurnala "Morskoy Sbornik"' ('On the Aims and Character of the Journal...'), MSb 9-12/1919, editors' comments p. 1, Klado's thoughts pp. 1-5.

232. 'O novykh zadachakh "Morskogo Sbornika"', MSb 1-2/1922, p. 1, 'More than two years have passed... since the article by Professor... Nikolay Lavrentevich Klado, who had died not long before, was printed...' This helps remind us of the short timescales involved.

233. A A Neznamov, Sovremennaya voyna, chast' vtoraya (Plan voyny, krepost', boyevaya podgotovka armii), (Contemporary War. Part 2. The War Plan, the Fortress, Military Training of the Army), (Vysshiy voyenny redaktsionny Sovet, Gosizdat, 1921). The stamp is that of the 'Biblioteka glavnago i general'nago shtaba'.

234. Brian James, 'The woman who invented perestroika', The Times, 2 March 1990, p. 12, col. 6, James' reported speech.

235. Ibid., quoting Zaslavskaya directly.

PART TWO. THE CONCEPT OF FUTURE WAR

'Terror is only natural...we cannot, must not lift the veil of the future without dread. For there, behind that veil, lie happiness and sadness, life and death...'

Nikolay Ostrovskiy,
Even the Wise Can Err, 1868.¹

'In every practical affair the questions of the day are only resolved correctly when those deciding them look into the distant future. In fact, the prime movers in developing the whole affair are not those, who think as their contemporaries think, but those who think, as mankind will think half a century hence.'

A Baumgarten,
Russian Artillery
Journal, 1896.²

'The method of dialectical materialism makes it possible to foresee the future scientifically.'

Marxism-Leninism
on War and Army, 1968.³

1. THE IDEA OF THE FUTURE, ORIGINS AND EARLY DEVELOPMENT OF FORECASTING AND PREDICTION

The idea of the future as a state in which different technological and social conditions and mental attitudes apply, of a different kind of future, is relatively new. The 13th Century English visionary Roger Bacon, it is true, had forecast that human ingenuity would make 'powered vessels, vehicles and comfortable passenger aircraft possible.'⁴ As far as the majority of people in responsible positions were concerned, however, one must agree with one of the founders of 'Futures Studies', I F Clarke, writing in 1969:

'About 200 years ago the image of the future was a blank. The centuries ahead produced a verdict of no change: the windmill, the waterwheel and the horse would continue to provide their entirely predictable minimum of energy; and travellers could not hope for any improvement in the two weeks of rattling by springless stage coach on the journey from London to Edinburgh...'⁵

Within a few years, this began to change. The Scientific and Intellectual Revolution of the 17th Century was one pre-requisite: the 18th Century provided the technology.⁶ The first recorded manned balloon flight, on 21 November 1783, immediately gave rise to discussion of its possible military applications.⁷ During the next half century technological advance centred on the steam engine wrought enormous changes, although the impact on the pattern of thought appears to have been somewhat delayed. However, the 1860s and 1870s saw a significant increase in awareness that the rate of change was accelerating and that the great industrial nations had to learn new techniques of adaptation.⁸ The period at the end of the nineteenth century and leading up to the First World War was particularly rich in imaginative, fictional views of the future, as exemplified by the work of H G Wells.⁹ Wells' work had considerable influence in the Soviet Union: he corresponded with Lenin and conversed with Stalin, although he was apparently sceptical of Lenin's futuristic dreams.¹⁰ There is much truth in the idea that without a capacity for imagining the future, at least in general terms, people would not have been able to solve complicated problems of a scientific, economic, political or military nature. 'One must cultivate this capacity in oneself - one must learn to dream, and so coordinate the work of today with the problems of tomorrow'.¹¹

The experience of the First World War and the social and technological changes that followed led to the appearance of more scientific forms of forecasting. In the 1920s and 1930s, official forecasting supplanted predictive fiction, particularly in regard to economic planning.¹² These methods, and the practice of technological forecasting could trace their origins to the First World War.¹³

The very idea of the future was thus in large measure a function of technological change, and this, as well as

the evident and increasing influence of technology on the possible conduct of war, reinforces the position of technological change as a key element and catalyst throughout this study.

In the military sphere, there was also a long standing tradition of planning for future operations. Even before the idea of the future as a different state had crystallised, military commanders had to make contingency plans for possible future campaigns. Thus, the eminent seventeenth century Field Marshal Montecuccoli (1609-80) authored a plan for a 'Possible Campaign against the Turks in Hungary'¹⁴. These plans only envisaged campaigns in the near future: next spring, or in a year or two's time, though even Montecuccoli noted the technological superiority of his own artillery over that of the Turks as a factor. Whereas Machiavelli's Art of War, (1521) and Discourses reveal a scholastic recapitulation of classical authorities, Montecuccoli was drawing empirical lessons from recent events, and writing them down.¹⁵

From these rudimentary beginnings the organised study disciplines of military geography and military statistics developed. Military geography, as a component of the military-scientific framework of thought in Russia was begun by Yazykov, who, in turn, was inspired by Jomini. By the 1860s, under the auspices of the enlightened War Minister Dmitry Milyutin, teaching at the Russian Nicholas Academy of the General Staff included Military Geography, Military Statistics and Military History, the latter comprising general trends over the centuries ('history of military art') and detailed campaign case studies ('military history' proper). The latter, and military statistics, as well as military geography were utilised in the formulation of strategic plans.¹⁶ The intellectual framework for scientific prediction and planning for future war was thus taking shape. Even before this, by the early nineteenth century, officers schooled in

military geography and statistics were producing highly sophisticated analyses of potential theatres of war and the deployment of potential adversaries.¹⁷

Understandably, it was in the realm of naval warfare that the influence of new technology on war asserted itself first and most obviously. Significantly, this was not in the realm of armament, but of propulsion. A very long time elapsed between the first voyage of a steam powered ship on Dalswinton Loch in 1788 and the application of steam power to ships of war, but by the 1830s it was a topic of informed discussion.¹⁸

The so-called 'long peace' from 1815 to 1848 and the breath taking experience of the Revolutionary and Napoleonic wars also gave European land forces' staffs both the leisure and the incentive to undertake studies of the conditions likely to influence future conflict, which now came to include new and hitherto untried element which would clearly be crucial in any future conflict: the railway and the electric telegraph (the latter appearing in 1832).¹⁹

As with steam propulsion at sea, it was the railway, more than any new device in the field of weaponry, which first induced commentators to consider possible changes to the nature and pace of military operations, and thus the character of future war. Clausewitz had opined that armies of developed countries would always be on much the same level as regards equipment and training, and therefore tended to dismiss the impact of technology, although he acknowledged that weapons influenced tactics which in turn again influenced weapon design.²⁰ Jomini, who lived longer than Clausewitz, into an era of accelerating technological development, was more expansive on the subject of weapons technology. Jomini graphically portrayed a future battlefield in which men and horses might once again have to don armour to compensate for the increased firepower of modern weapons. This is

particularly interesting as he saw technology as the counter to technology and not, as proved to be the case, the adoption of greater dispersion and new tactical forms. As part 1 has demonstrated, Jomini had an active influence on Russian military thinking through direct personal contact with the Tsar and reformist War Minister Milyutin.²¹

Logically enough, however, it was from military geography and statistics that the first serious attempts to 'lift the veil of the future' emanated, in the form of studies on the influence of railways on theatres of war. The Soviet historian Meshcheryakov has said that this was explored by the Russian N Neyelov (Neelov) in his Sketch of the Modern State of Strategy, published in two volumes in 1846 and 1847,²² but Neyelov makes no direct reference to railways, even when discussing operational and strategic lines. The 1840s were a period of rapid railway construction and expansion in Europe and first of all in Britain. The Russians did use the railway to transport a corps from Russian Poland to Moravia to effect a junction with the Austro-Hungarian army in 1849, (though apparently reluctantly and at the Austrians' suggestion), an early manifestation of the influence of a major technological change - the railway - on the pace and character of war. Although there was a railway, there was as yet no telegraph line to Moscow, so the commander on the spot had to take the decision without the Tsar's approval, an interesting example of a temporary mismatch between new means of strategic mobility and new means of command, control and communications.²³

From now on, it would be necessary to take account of such technological changes, and the Crimean War (1853-56), where the Russian wooden sail fleet was so manifestly outclassed by the iron framed (but not yet armoured) and steam powered combatants of Britain and France that it dared not even put to sea, drove the point home. The

Russians did, apparently, receive a submarine from a German inventor, but made no decisive use of it.²⁴ Even military theorists like Bogdanovich, who had believed in unchangeable, 'permanently operating factors', were forced to revise their views, in Bogdanovich's case after a period of tortured confusion.²⁵ Henceforward, images of the character of future war, involving the influence of technology first of all on strategy and logistics and, later, on tactics, would develop in parallel with war plans for specific encounters and campaigns, though not always at the same rate

However, there was first of all a serious gap between theory and practice; between peacetime strategic planning and action in the theatre of military operations. Milyutin, appalled, noted that at a meeting of the Russian Army command on 6 September, 1877, no plan for future action was apparent. 'Discussion concentrated on the immediate future, that is, on the following day'.²⁶ Secondly, the Russians were prevented from achieving the quick kill they desired, in part, because they had not simultaneously taken account of the effect of new weaponry on tactics and adjusted their procedures accordingly. They therefore faced unexpected and crippling delays at Plevna.²⁷

As part 1 has demonstrated, it was at this stage that the terms '(a)future war' and 'contemporary war(fare)' appeared in Russian military writing.

2. DEFINITION OF 'FUTURE WAR' AND OTHER TERMS ENCOUNTERED
Within Soviet military thinking, the concept of 'future war' - budushchaya voyna - occupies a cardinal position. The translation of budushchaya voyna and its relation to the other term widely used, sovremennaya voyna ('contemporary war' or 'modern war'), is fundamental to this study. The Russian language lacks the definite and indefinite articles, and this complicates any understanding and translation of these terms. The

adjective *sovremenny* is usually translated 'contemporary', since the Latin components of that word correspond to the Russian: so - 'with', vremya - 'time', but 'modern' would be equally acceptable.

Budushchaya voyna and sovremennaya voyna may appear to be used almost interchangeably in Soviet military writing, at least where the near future is concerned. Thus, the contents of one of the standard collections of military works of the interwar period, Questions of Strategy and Operational Art in Soviet Military Works 1917-1940, include many references to each. Using the provisional translation given above, the book includes Frunze's Front and Rear in Future War, Vatsetis' On Military Doctrine of the Future, Triandafillov's Character of the Operations of Modern Armies, Belitskiy's Strategic Reserves in Contemporary War, Krasil'nikov's Organization of Powerful All-Arms Formations of the Future, Kalinovskiy's What Mechanization and Motorization can do in Future War, Favitskiy's The Role of Mechanized Forces in the Contemporary Operation, and Sukhov's Tanks in Contemporary War.²⁸ The use of budushchaya voyna and sovremennaya voyna almost as synonyms continues closer to the present day: a selection of articles in the Military-Political Directorate's Journal Communist of the Armed Forces (KVS) dealing with possible war in the future includes 'Character and Particular Features of Contemporary War'(1962),²⁹ 'On the character and types of Wars of the Modern Epoch(1965),³⁰ Contemporary War and Economics'(1967),³¹ 'Character and Particular Features of Contemporary War(again)(1969),³² 'The moral factor in Contemporary War'(1972),³³ 'Character and Particular Features of Modern Wars (1975).³⁴

Within a given article, the various terms are also interposed. An article on 'Air Reconnaissance' from 1938 begins by mentioning foreign discussion of the character of future war. It then mentions 'contemporary war',

'contemporary armies', and concludes by referring to a 'future enemy' and 'future war'.³⁵ An article from 1965 on 'Economics and War' mentions the 'character of a probable war', of 'contemporary war'(even in the context of a nuclear war),and, in quick succession, 'future war', 'possible variants of wars', 'future war' and 'modern weapons of destruction'.³⁶ A 1988 article on the deployment of rear service elements in the first period of the Great Patriotic War(1941-45) concluded that there would be absolutely no opportunity to reorganize such services in the 'opening period of a modern war'.³⁷ The latter, or 'a war today' seem to be the only feasible translations.

That contemporary (modern) armies and weapons, and contemporary(modern) strategy should be designed to fight future wars is logical enough. This thought is clearly present in the work of Aleksandr Neznamov(1872-1928), whose work on Contemporary War provides a firm conceptual and semantic grounding for present concepts.

'Principles are eternal, but means of fighting change; with them, obviously, methods and forms must also change. The task of theory is to recognise these contemporary(sovremennye) forms and methods and even to look a little ahead, into the near future (v blizhaysheye budushcheye). As an idea, this task has an immovable foundation in the finest precedents [lit. 'images'] from all times and from all peoples; for the executive part it must make use only of the wars of the recent past (blizhayshego proshlogo), that is, those in which there were evidently contemporary factors, to which one must relate in strategy: railways, the telegraph and mass armies, and in tactics: rapid firing weapons and the telegraph (telephone).

The aim of the present work is to present the conduct of operations in conditions of contemporary warfare (sovremennoy voyny)...³⁸

Given the specificity and precision of the Russian language, and military Russian in particular, it seems uncharacteristic that the two adjectives budushchiy and

sovremenniy should be used so freely. In many cases, the inference is that budushchaya voyna refers to a particular war in the future, a possible war, as an occurrence, as a political event, whilst sovremennaya voyna refers to modern warfare: the art of war in its present state, and as likely to be applied in a future war.

When Russians knowledgeable about military affairs are presented with the words budushchaya voyna, they certainly react as if you are saying 'World war III'. The author's discussions with Soviet military academics including a Professor at the Academy of Sciences specialising in War Economy have confirmed that today 'budushchaya voyna' has much the same ring as 'World war III' in English.³⁹

'World War III' would, indeed, be an acceptable 'equivalent-effect' translation. When the author asked the former Soviet GRU officer calling himself Viktor Suvorov about budushchaya voyna his reaction was immediate. 'World War III, you mean?', he said.⁴⁰

This conclusion is further supported by the statement made by Soviet General Staff representatives in 1989 that since about 1980 they had eschewed the use of 'budushchaya voyna' because it implied that (a) future war was inevitable.⁴¹ However, as part 4 demonstrates, many Soviet authorities have not adopted this reasoning and regard that argument as pedantic.⁴² This is a question which has arisen relatively recently and is addressed under 'The Soviet view of future war from the time of writing'. Furthermore, there appears to be no problem using the term budushchaya voyna retrospectively, as the apparently seminal recent article by Kokoshin and Lobov on 'Foresight' illustrates by referring to Svechin's view of the 'Character of (a) Future War', from the 1930s.⁴³

Bearing these arguments in mind, where appropriate, the author will henceforward adopt the convention of translating sovremennaya voyna as modern warfare. However, even this is not always appropriate. For example, in

Ruban's article (KVS 24/1972), cited above, which we will now translate 'The Moral Factor in Contemporary Warfare', there is mention of 'a new war being prepared by the reactionary forces of imperialism, of its character and particular features'.⁴⁴ Izmaylov's article (KVS 6/1975), cited above, the title talks of contemporary (modern) wars, in the plural, so the translation 'warfare' is not appropriate, but within the text the author discusses 'modern warfare' in the singular.⁴⁵

One of the Soviet Union's greatest military thinkers this century, Marshal Tukhachevskiy, provides a useful illustration of the difficulties in translating the nuances of meaning. His Questions of Contemporary Strategy, a paper given in 1926, contains a section on 'The Character of a Future War'.⁴⁶ This is consistent with the distinction made above. However, the collection of papers published by the Communist Academy in 1930 includes Tukhachevskiy's, On The Character of Contemporary Wars in the Light of the Decisions of the VI Comintern Congress. Among the 'published papers' listed at the back of the collection is one by Tukhachevskiy called The Character of Future wars in the Light of the Decisions of the VI Comintern Congress.⁴⁷ Although it is possible that these are two slightly different papers (the author was unable to trace the latter, if, indeed it is a different paper), the issues discussed are unlikely to differ substantially, if at all. This therefore seems to provide a categorical demonstration of the use of budushchaya voyna (or budushchiye voyny, in the plural) and sovremennaya voyna (or the plural) as virtual synonyms.

There is, however, the possibility that 'contemporary war' and 'future war' suggest a chronological differentiation. Some of the references to 'future war', especially in articles written in the 1920s and 1930s suggest warfare shaped by the assimilation of technology which was in fact only just being introduced or even

envisaged. Thus, one of the Soviet visionaries, A Verkhovskiy, noted in a lecture to the Red Army Academy in 1925 that in the middle ages armoured knights formed the advanced striking force and the billmen on foot following behind were only auxiliaries. This, said Verkhovskiy, 'is the direction in which future war is developing. This is what western Europe is striving towards'.⁴⁸ Verkhovskiy was one of those who perhaps exaggerated the significance of pure armoured forces; his vision was correct as far as the opening campaigns of World War II were concerned, although as the war progressed combined arms reasserted themselves.⁴⁹ Although western Europe was arguably moving in the former direction in 1925, the Red Army in 1925 would have been utterly incapable of operating in this manner and would remain so for many years. More pertinent to this section of the thesis, Verkhovskiy was clearly using 'future war' as a concept here, and not talking about a specific future war.

Conversely, the widespread use of the term contemporary war in the 1960s and 1970s, when talking about nuclear war, very obviously referred to a war which could break out tomorrow using weapons which already existed and were already targeted.⁵⁰

Turning once again to the very modern context the General Staff have stated that 'contemporary war' has a distinct and specific meaning: the next ten years, and that studies beyond that lie within the area of 'Military Science'.⁵¹ However, we cannot be sure that this convention has been widely adopted, and it cannot be applied to the vast body of literature and evidence from before the 1980s.

In most other cases there is no clear chronological distinction, and both adjectives are sometimes used to refer to a war or warfare in the near future: any war, in fact, which has not actually happened. At either end of the timescale, the distinction becomes more clear cut.

'Contemporary warfare' could also, for example, refer to wars actually being fought elsewhere in the world,⁵² although Soviet practice tends to identify such wars more precisely. They are referred to either as 'local wars',⁵³ or, for example, in the case of World War II before the Soviet Union became directly involved, as 'The Second Imperialist War'.⁵⁴ In the case of 'a future war' or 'modern warfare', the terms may tend to be overused in order to avoid identifying the probable opponent; with wars that have happened or are taking place, this is not a problem.

Wars which are taking place in which Russia and the Soviet Union are involved can be referred to as 'nyneshnaya voyna' - 'the present war'.⁵⁵ In 1915, World War I might also be referred to as 'nyne razygryvayushchayasya mirovaya voyna: 'the World War currently unfolding'.⁵⁶ Turning to the more distant future, the term budushchaya voyna becomes uniquely appropriate, but it seems to be used in this context relatively seldom. In such cases one might expect a more specific phrase, using the same construction, perhaps as 'vozmozhnost' voyny v blizkom budushchem' - 'the possibility of war in the near future',⁵⁷ but specifying a more distant future. Brezhnev's 1977 Tula speech, as a final example, referred to the diminishing possibility 'of a new great War': 'novoy bol'shoy voyny'.⁵⁸

Other terms are used for variety and dramatic effect. As in English, *zavtra*, 'tomorrow', and the adjective from it, far from literally meaning tomorrow, can, perversely, refer to a more distant and uncertain future. Verkhovskiy's 1925 lecture, referred to above, was entitled 'War of Tomorrow', in which he took a long and broad perspective. Within the reported section of the lecture there were, however, references to 'future war'.⁵⁹ Another term sometimes encountered throughout this century is an 'impending' war - predstoyashchaya voyna -

suggesting a certain grim inevitability.⁶⁰

3. THE PLACE OF 'FUTURE WAR' IN SOVIET MILITARY THOUGHT

As noted in part 1, VES(1983, 1986) and SVE(1976-78)

do not include specific entries on 'future

war'(budushchaya voyna). This may be connected with the problem of inevitability implied by 'budushchaya voyna', mentioned above, and these reference works were published at about the time that one element of the General Staff had apparently stopped using the term. As also noted, the relevant volume of the 1933 SVE has a seminal entry on the subject. This acknowledges that attempts to analyse the causes, course and consequences of 'future war'(in this case the concept appears to be expressed in general terms and the translation 'a future war' is inappropriate) and to establish the character of its operations had been made throughout the history of military art. Furthermore,

'Views on the character of future war form a most important part of the Military Doctrine... of one state or another and exercise a significant influence on its practical preparations for war'.⁶¹

The statement that 'future war' is 'a⁶² most important part of Military Doctrine' is revealing. In modern Russian, the terms 'Military Science', 'Military Doctrine' and 'Military Art' all have precise and defined meanings, and these need to be understood before the concept of 'future war' is related to them.

The overall study of the phenomenon of war in Marxist-Leninist thought is Military Science. This is defined as 'a system of knowledge of the character and laws of war, preparation of armed forces and the country for war and means of conducting it'.⁶³ Military Science concerns the essence, nature and content of armed conflict, and investigates the laws governing it. Together with the other sciences, Military Science studies war as 'a complex socio-political problem'. Its conclusions are used to work out Military Doctrine. Military Science comprises a

number of subsets including Military Art, (arguably *primus inter pares*), Military Organization, Military Education and Training and the Theory of the Military Economy and Rear Services.⁶⁴ Military Art, as the central and pre-eminent part of Military Science, embraces the preparation for and conduct of war at the three descending levels of strategy, operational art and tactics.⁶⁵ The relationship between Military Science and Military Art has not always been perceived in such clear-cut terms: the 1928 edition of the Great Soviet Encyclopedia saw them as complementary, but not as the former embracing the latter. The theory of Military Art disposed of a number of 'corresponding military sciences (Strategy, Operational Art, Tactics)', while the 'military sciences' (plural) comprised groups such as the military historical, military geographical and so on.⁶⁶

Military Doctrine, which is established by drawing on the conclusions of Military Science and other sciences (natural and social) has traditionally been defined as the officially expressed view of the state on the aims and character of a possible war.⁶⁷ The idea of Military Doctrine as an officially recognized set of scientific principles was clearly expressed at the beginning of this century by Neznamov, and he was cited with approval by Soviet authors in the 1960s.⁶⁸ In that decade, Military Doctrine was defined as

'an expression of the scientifically based views officially adopted in a state, concerning the political assessment of a future war, the attitudes of the state towards that war, the determination of the character of a future war and methods of waging it, of preparing the country for war economically and morally... a state adopted system of views on the basic problems of war'.⁶⁹

This definition changed little between the late 1920s and the mid-1980s.⁷⁰ The 1920s definition of Military Doctrine stressed, *inter alia*, the way that the objectives

of military forces and 'the character of the military objectives before them' were to be resolved 'in concert with the class essence of the state and its productive capacity as determined by its level of development'.⁷¹ The interplay between the character of future war and the level of technological and economic development, and between both and the overall 'level of development', in other words, cultural development, is of recurring importance.⁷²

Perhaps the last and most precise attempt to define Military Doctrine before the current era of reform was made by Marshal Nikolay Ogarkov in 1982. Ogarkov set down the aims of Doctrine very firmly, underlining the 'interlinked and interdependent socio-political and military-technical aspects':

'What is the degree of probability of a future war and whom will we be fighting?

What is the character which the war a country and its allies will be fighting will assume (predstoit vesti)?

What aims and tasks can be assigned to Armed Forces in foreseeing (predvidenii) such a war and what Armed Forces must the country have to achieve the stated aims?

Proceeding from this, how should one develop military organization (stroitel'stvo) and prepare the army and country for war.

Finally, if a war should break out, by what methods (sposobami) should it be fought?'⁷³

It is noteworthy that Ogarkov still used the phrase 'a future war', even though the General Staff, of which he was head, had supposedly stopped using it.

Although a new definition of Military Doctrine was being devised during 1987 and 1988, the relationship between Military Science and Military Doctrine appears to have remained constant. This relationship was expressed most clearly and elegantly by Colonel-General Gareyev in his address to the British Royal United Services' Institute in October, 1988.⁷⁴ Military Science, like Natural Science, depends upon the existence of differing

points of view. This accords with the Marxist-Leninist emphasis on the dialectic. However, said General Gareyev, practical work demands certain common points of view. It would be impossible to run any enterprise, let alone one as vast, complex and demanding as a military system, equipment procurement and planning for war, without certain basic shared assumptions. Therefore, at some point the debates which take place within the context of Military Science have to be evaluated and converted into certain accepted tenets, a 'generally accepted system of views'.⁷⁵ The latter is Military Doctrine.

During the post-war period other Warsaw Pact states adopted the Soviet definition of such terms, though not without a twist of indigenous variety. A Polish definition from 1970 confirmed the central position of 'przyszła wojna'-'future war', a term which, in some cases, had acquired inverted commas, indicating that it was a distinct concept:

As a result of agreement at the highest level and the synthesis of expectations, proposals and the analysis of exchanged (and also other) factors there is now already a concrete decision, relating to the general conduct of an (intentional, possible) future war, that is, a war which may be offensive; initially defensive, and later offensive; nuclear; limited or unlimited. That general decision, which is evened out to form a general pointer to the executive, we call our command doctrine.⁷⁶

According to sources up to 1988, then, Military Doctrine establishes the likely opponents in a possible conflict, its military, economic and political nature, and the objectives of the state and its armed forces. Military Doctrine comprises two closely linked and interdependent aspects: the political and the military, with the former playing the leading role. 'The character of (a) future war' is a most important and all-pervading part of Military Doctrine, as stated in the 1933 article and attested by the fact that the term has recurred constantly

in articles about Military Doctrine ever since.⁷⁷ The most recent (1986) edition of the Military Encyclopaedic Dictionary, for example, defined Military Doctrine as a system of views, 'on the essence, aims and character of a possible future war...'⁷⁸

Since 1988, Military Doctrine has been redefined as a system of views on the prevention of war. The precise text of the re-defined Doctrine and the implications of the change are addressed in part 4. However, the author will argue that this does not displace the view of the character of a possible future major war or other armed conflicts from its central position in Military Doctrine, however undesirable those wars may be. As General Gareyev pointed out in lively fashion, although war prevention was the 'primary goal' or core' of the USSR's Military Doctrine, if that Doctrine fails, 'we do not intend to give up'.⁷⁹ This change also raised the issue of where 'war prevention' fitted into the traditional division between the military-technical and political segments of Doctrine. It was suggested that war prevention might not fall into either category, but exist 'as an independent category under the new doctrine'.⁸⁰ As explained in part 4, one of the author's conversations, and common sense, suggested that war prevention must in fact belong to both, although there were indications that Soviet views had not fully crystallised.

This raises a second issue, also addressed in part 4, that Soviet thinking about possible future wars and warfare has concentrated overwhelmingly on a great war between the world systems. This thesis was completed on a watershed, as the structures for conducting such a war, particularly the Warsaw Pact, began to show distinct signs of breaking up, while the Soviet Union, having extricated itself from one guerrilla war in Afghanistan, appeared for a time to be getting embroiled in another one in its own territory. Possible 'local wars', and 'low intensity'

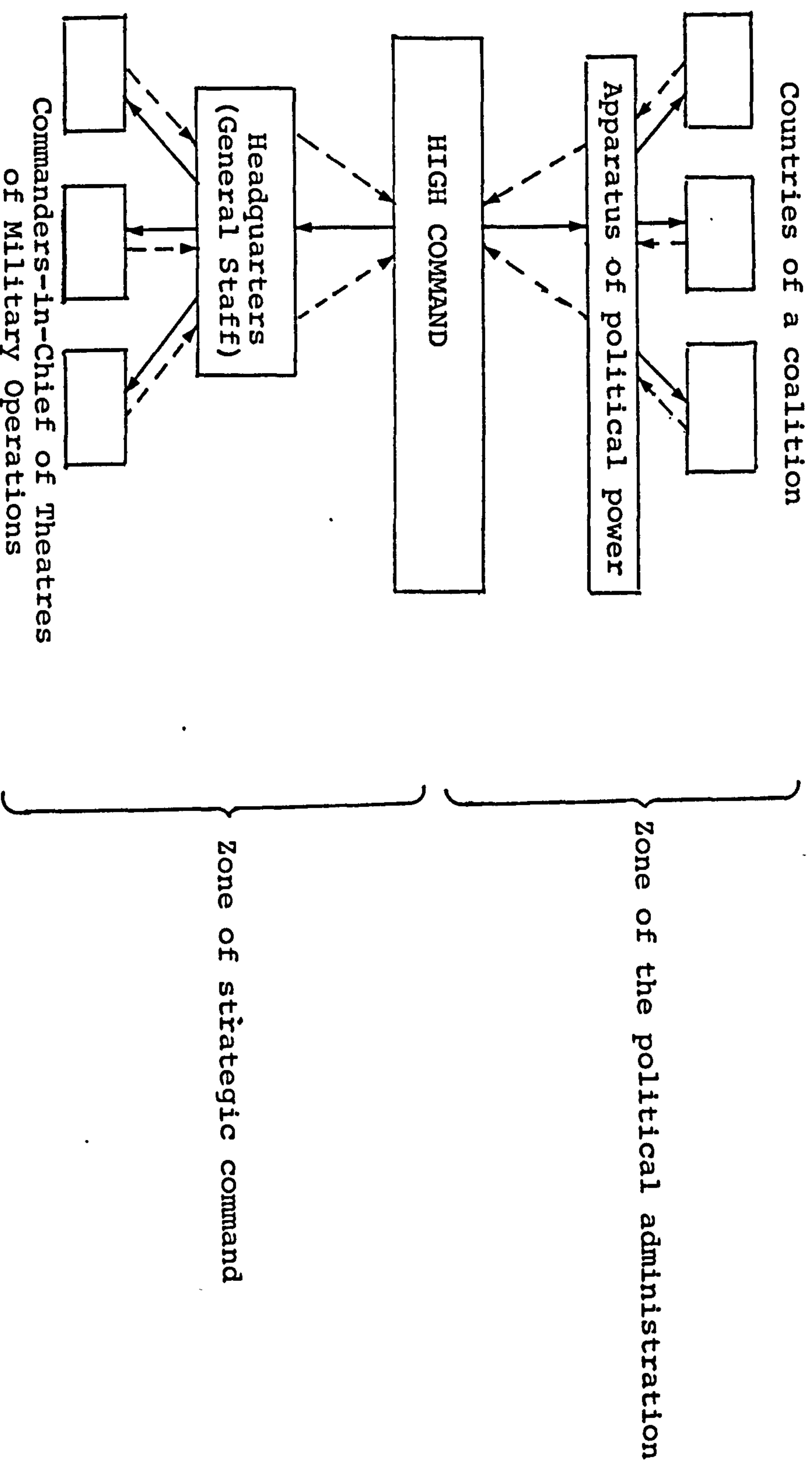


Figure 2.1. Feedback (Sprzężenia zwrotne) in the relationship between strategy and politics

Source: Skibiński, Z historii doktryn wojennych, WPH 4/1970, p. 251.

conflict appear to have played little part in the discussion of the character of future war to date. The lessons of local wars are considered, but only in terms of their lessons for a future major war: the lessons of the Middle East wars for tanks and anti-tank weapons, for example.⁸¹

The alternative term 'contemporary war' is also used as if it forms a part of Military Doctrine, reinforcing the argument that the terms are to some extent interchangeable. Thus, at the fourth session of the USSR Supreme Soviet, in January, 1960, Nikita Khrushchev gave 'a deep analysis of the character of contemporary war, which lay at the basis of Soviet Military Doctrine.'⁸² Under the heading of 'Doctrine', the character of future war is viewed from two points of view. The first is the political. The second is the 'military (technical)' viewpoint, sometimes described as the 'military-strategic (technical) aspect.'⁸³ Future war therefore faithfully reflects the division of Military Doctrine into political and military segments, further reinforcing its position as part of Military Doctrine. A Polish source put a slightly different emphasis on the idea, suggesting that Military doctrine lay across the boundary between strategy and politics, as shown in figure 2.1.⁸⁴

The 'character of war' also has a formal definition. A war's 'military-strategic (technical) character' is determined under modern conditions by the technology employed (nuclear or non-nuclear; the methods and forms of conducting military operations (war of position or war of manoeuvre); the scale (world war or local war); the participants (a coalition war or war between just two parties); and its duration (long or short).⁸⁵ There is therefore provision within the theoretical structure for Soviet military thinkers to shift their attention to long, 'local' and, by implication, possibly guerrilla wars, should they so decide.

If Military Doctrine, as a state system of views on war and preparations for war, is elaborated and defined by the state leaders, it proceeds from an evaluation of the political objectives, the economic, scientific-technical, and military potentials of the Soviet Union and of its probable adversary. The evaluation includes an assessment of both societies' (including coalitions') ability to mobilise resources for war. The evaluation is based on the conclusions and recommendations presented by Military Science. The job of Military Science is to examine all possible means, methods and forms of conducting a future war, taking into account socio-political and military-technical development.⁸⁶

The character of future war forms part of Military Science as well. The 'superiority of Soviet Military Science' in the Great Patriotic War has thus been attributed to the fact that one of its 'outstanding characteristics' was a 'deep scientific prediction of the character of future war'.⁸⁷ Marxist-Leninist teaching on war, and Military Science, both came to the conclusion that 'future war would inevitably have a prolonged character and require maximum exertion of the state's resources'.⁸⁸ The relationship between Military Doctrine and Military Science is complex and reciprocal: as the prominent modern Soviet military writer General M M Kir'yan has explained, 'Military Doctrine gives Military Science the task of working out scientific problems, connected with researching the character of future war'.⁸⁹ He continued by repeating exactly the same formula: Marxist-Leninist teaching on War and Military Science had both come to the conclusion that 'future war would inevitably have a prolonged character and require maximum exertion of all the state's resources'.⁹⁰

Military Doctrine, having weighed and evaluated the findings of Military Science, and other sciences drives Military Art. The character of future war contributes to

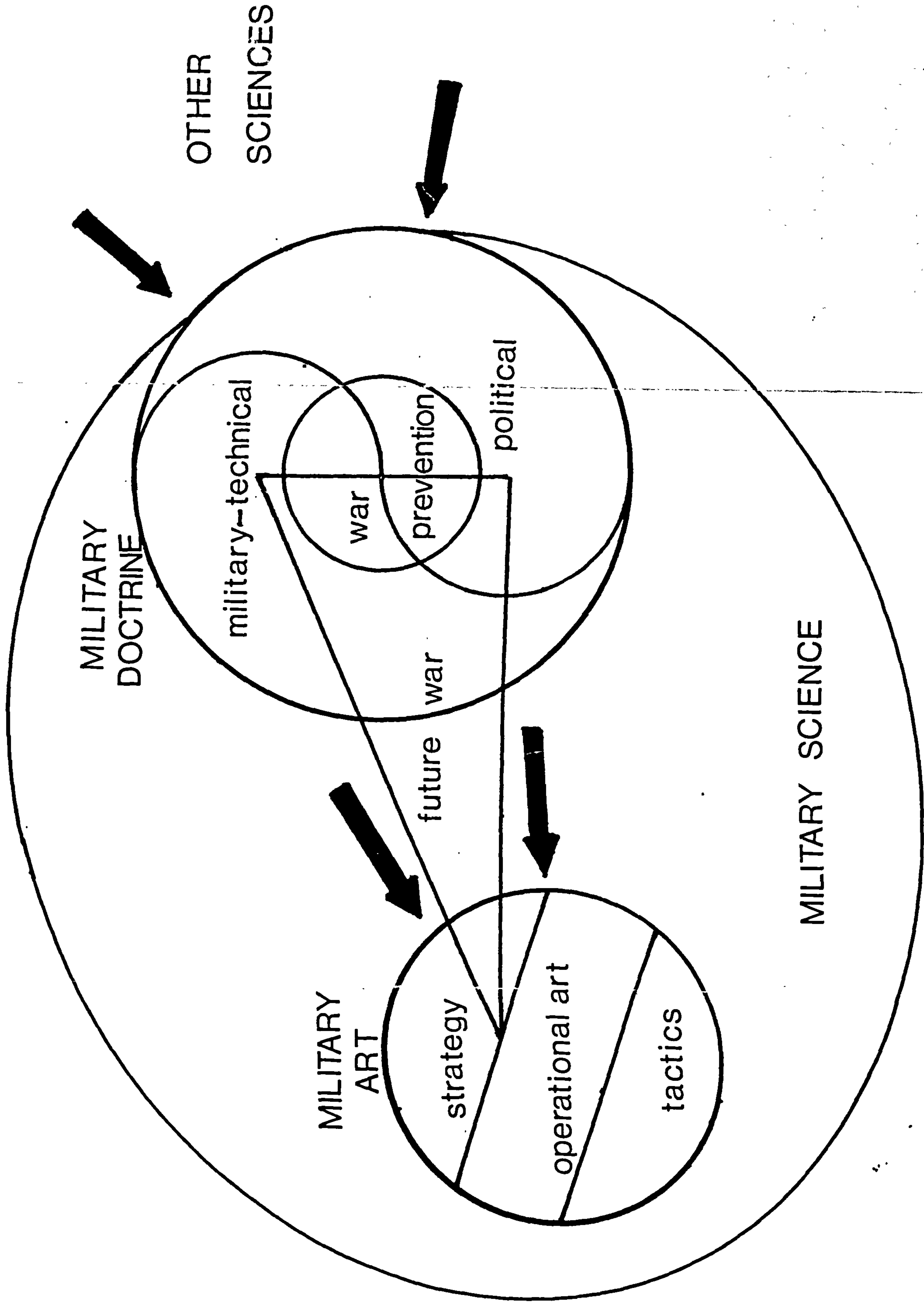
Doctrine's directives, but also forms part of Military Art. The highest level of Military Art is Military Strategy, and according to Marshal Ogarkov's article in the Soviet Military Encyclopedia, which must be regarded as definitive for its time, there is a reciprocal relationship between Military Doctrine and Military Art, the latter exercising 'a reverse influence on Doctrine'.⁹¹

The character of future war can hardly form part of the practical side of Military Art, which is about fighting a war that is already happening, but it can arguably form part of its theoretical side. Marshal Sokolovskiy was in no doubt that the character of future war was part of the theory of Strategy. Aside from the fact that his book on the subject was riddled with references to future war(as was the previous volume on Strategy by Svechin), he stated categorically that

'The next important element forming part of military strategy is the question about the character of future war. Here, strategy examines the conditions and factors which, at a given moment in history, determine the character of future war, the way military and political forces are distributed, the quality and quantity of material resources, military and economic potential, the probable composition and potential of opposing coalitions and their geographical distribution'.⁹²

The advent of the guided missile and nuclear warhead naturally expanded the scope of military strategy, because missiles were far less limited by geographical, logistic and demographic conditions than earlier 'strategic' assets. However, the view that the character of future war also formed part of military strategy, as well as of Military Doctrine and Military Science, was not a temporary reflection of what is now seen as Sokolovskiy's over-emphasis on nuclear weapons and their role.⁹³ A modern commentator, Kir'yan, continued to emphasize the role of strategy in determining the 'military strategic character of future war, the degree to which nuclear weapons and other weapons of mass destruction would be

Figure 2.2. Relationship of Military Science, Doctrine and Art, the political and military-technical aspects of Doctrine, and the character of future war.
(Author's deductions, based on a wide range of sources explained in the text).



used in it, and the ways in which they would be used'.⁹⁴
The character of future war is therefore not only a determining factor in shaping strategy, but also part of it.

The character of future war therefore affects Military art at all levels but, except in the case of strategy, it is arguable that its influence is at one remove. If we take a recent comment on tactics, the lowest level of Military Art,

'The theory of group tactics, which met the requirements of the 1920s, did not correspond to the requirements of (a) future war'.⁹⁵

Thus even tactics should respond to the character of future war, but does not itself embrace the study of its character.

Having analysed the Soviet written sources, it is possible to represent the character of future war in relation to Marxist-Leninist thought diagrammatically, as shown in figure 2.2. 'Future war' is shown intruding into the realm of strategy, but not into the lower levels of Military Art, although they are clearly shaped by it.

'Contemporary warfare', or 'modern warfare' can be considered largely as a synonym for 'future war'.

4. LIMITS OF THE CONCEPT OF THE CHARACTER OF FUTURE WAR

The concept of the 'character of future war' clearly extends as far as detailed assumptions regarding the opening phases of hostilities and probable opponents. Detailed aspects of war planning and war games could therefore be considered as part of this study, although the author has chosen to address broader pictures of future conflict. It is far more difficult to focus on the 'character of future war' if one does not have a particular opponent or opponents in mind, as the British Kirke Report on the Lessons of the Great War (1914-18) acknowledged : 'at present the enemy cannot be defined, and this absence of a basis to the problem adds enormously to

the difficulties of its solution'.⁹⁶ For the Russians, unlike the British and Americans who have enjoyed the security provided until recently by the sea, the land threat has always been a fairly tangible one, and this has perhaps sharpened their perceptions of 'future war'. However, one must take all the possibilities into account. Otherwise, the unexpected comes as an even harder blow, as General Kuropatkin noted after the 1904-05 Russo-Japanese War,

'The theatre of war in Manchuria presented many peculiarities of climate, geography and inhabitants. It was unlike any of the other "probable" theatres of operations that we had studied and was, therefore, quite new to the troops who came from European Russia'.⁹⁷

The course of military operations themselves has always been impossible to predict, so dependent is it on chance, luck and other imponderables, and in spite of the sophisticated computer modelling which is now available, it is likely to remain an unpredictable business, as Clausewitz and Jomini knew so well.⁹⁸ War is the collision of two living, thinking forces, and Russian and Soviet military thinkers have wisely limited their specific planning to the 'opening period' of any war. According to a recent article by Kir'yan, and the authoritative VES, the term 'opening period of the war' (nachal'ny period voyny) first appeared in literature of the 1920s in connexion with research into wars of the 'imperialist epoch', in particular World War I.⁹⁹ It had obviously acquired particular importance with the appearance of 'mass armies', the rapid switch from peacetime to wartime footings, and the need for their 'concentration and strategic deployment within the Theatre of Strategic Military Action (TVD)',¹⁰⁰ a process which, once initiated, was virtually impossible to alter. In fact, the term had been used, in the same context, since at least the 1890s. It featured extensively in the work

of the late Imperial Russian Military thinker, Nikolay Mikhnevich (1849-1927), who was War Minister during World War I.¹⁰¹ Mikhnevich's writing provides a useful guideline for the bounds of this study. He drew the distinction between a 'war plan' and a 'plan of operations'. The former included everything that could be done before the enemy's will entered into the equation, including strategic concentration and deployment and the 'character of an impending war'.¹⁰² As far as 'plans of campaign' were concerned, Mikhnevich cited Napoleon, who had said that he had never had one, and Suvorov who, when asked for his, waved a blank sheet of paper.¹⁰³

This thesis is broadly confined to the study of the idea of future war up to the limits of Mikhnevich's 'war plan' and is not concerned with the history of military events once wars have started, except in three cases. One is where a broad understanding of what happened is necessary to establish the accuracy or otherwise of pre-war views on the likely shape, appearance, scope, scale and duration of military operations. The second is where particular past battles are cited as precedents for future war. A prominent example of the latter are the battles of Kursk(1943) and Khalkhin-Gol(1939), cited today as precedents for defensive strategy options two and three (see part 4).

The third example is where there is evidence of lessons about 'future war' of a kind being drawn during a major conflict. As the Soviet 1936 Field Service Regulations¹⁰⁴ pointed out, and as the Collection of Materials for the Study of War Experiences, published during the Great Patriotic War, illustrates, armies must and do continue to draw lessons about future operations from their own battles during major war.¹⁰⁵

To complete the picture, Russian and Soviet Military Science has continued its analysis even during the immediate, exhausted (and perhaps politically confused)

aftermath of major war. In 1919 Klado stressed that 'the most important task after a great war- is the validation of the propositions of naval science according to recent experience'.¹⁰⁶ In 1922, Novitskiy was analysing the 'Military Experience of the World and Civil Wars of 1914-22 at Sea'.¹⁰⁷ The unflagging energy of Russian and Soviet analysts is impressive.

5. SCIENCE, TECHNOLOGY AND TECHNIQUE

Throughout the period under review, science and technology have occupied an increasingly dominant place in determining the character of future war. Indeed, as noted, the very idea of the character of future war as being something distinct and different which needed to be foreseen was to a large extent a function of the increase in the pace of technological and scientific development after the Napoleonic wars. As noted, Clausewitz did not envisage one European army enjoying any marked technological superiority over another.¹⁰⁸ This is somewhat surprising since, as long ago as the Seven Years' war, for example, the Russian General Saltykov had commented on the effect of the 'newly invented' Shuvalov howitzers at the battle of Kunersdorf.¹⁰⁹ Furthermore, even if weaponry used by the armies of the most developed nations develops at roughly the same rate, that development must, of itself bring about changes in the character of warfare, even if the change is not confined to one side, as Jomini was more aware.¹¹⁰

The role of science and technology is not confined to developments in weaponry, signalling and modes of transport. It is also reflected in the increasing application of science and mathematics to modelling future phenomena and the rate of change. It has, according to General Kir'yan, become possible to model

'the direction and tendencies in the development of armed forces, military technology and military art, both in one's own country and among the probable or real enemy; the character, course and outcome of

future war'.¹¹¹

The phrase the military-technical character of future war, one of the two halves of the concept of future war, at first sight stresses the technological component of the equation. However, 'technical' not only refers to technology, but also to technique. Changes in technique may be associated directly or indirectly with changes in technology. Thus, the general adoption of indirect fire technique for artillery at the beginning of this century certainly reflected technological advances - primarily in the range of guns - but was not in itself a technological change. It was a change in procedures and attitudes accompanied by the simplest of mechanical devices (at first) - the non-optical dial sight.¹¹² The phrase 'military-technical' as used in Russian extends to cover 'technical ' aspects of military operations: the integration of infantry, artillery, armour and air, how operations are planned and controlled. It is arguably not so much changes in technology itself but associated changes in technique, which have altered and will continue to alter the character of war.

The interdependence of technology and technique was apparent to Stalin, who made it a central part of his address to the graduates of the Red Army Academy in 1935:

'having outlived the period of famine in technical resources, we have entered a new period, a period, I would say, of famine in the matter of people, in the matter of cadres, in the matter of workers capable of harnessing technique and advancing it. The point is that we have factories, mills collective farms, Soviet farms, an army: we have technique for all this, but we lack people with sufficient experience to squeeze out of technique all that can be squeezed out of it. Formerly we used to say that "Technique decides everything". This slogan helped us in this respect, that we put an end to the famine in technical resources and created an extensive technical base in every branch of activity for the equipment of our people with first class technique'.¹¹³

The Red Army Academy, the centre for thinking on the likely character of future warfare, was a most appropriate forum in which to stress the reciprocity between technical resources and technique.

The military-technical character of future war is largely determined by the study of evolving science and technology and by 'generalization of the experience of past wars'.¹¹⁴ In the 1930s, Soviet commentators considered that western theorists had placed too much emphasis on technical factors, to the exclusion of 'moral political' ones (the political side of future war, and of Military Doctrine). In contrast, Frunze and Voroshilov were considered to have put forward propositions that would lead to the creation of a 'Marxist-Leninist theory of future war', in the event of capitalist aggression.¹¹⁵

The interface between men and machines: between new equipment and its operators, is cardinal in considering the character of future war and occupies a dominant place in the literature.¹¹⁶

6. SYSTEMS THINKING AND FUTURE WAR

The interaction of technology, technique and tactics is, however, only one element in analysing the character and outcome of a future war. War is a form of social intercourse, and a game of chance, as Clausewitz knew:¹¹⁷ a 'great drama, which one should not reduce to mathematical calculations', as Jomini knew.¹¹⁸ Although it conforms to many of the principles of normal life, war between civilized countries is an abnormality, like disease to a normally healthy body. It contains elements of chaos. In this context, Russian and Soviet work on systems, on cybernetics, gives another important perspective on the subject.

The task of taking thought processes from several widely differing areas and combining them into a single discipline was explored by Aleksandr Bogdanov (real name Malinovskiy) (1873-1928) and Nikolay Bukharin (1888-

1938).¹¹⁹ Bukharin's fall from favour spelled the condemnation of systems thinking: when, later cybernetics and systems theory proved indispensable, history was rewritten to prove that Marx and Lenin had in fact invented it.¹²⁰ Bogdanov's Tectology: the Universal Organizing Science, first published in 1913, appeared in a world where the accepted system was soon to be shattered by an apocalyptic disturbance, World War I.¹²¹ Bogdanov took part in the war as a military doctor. Whereas the first edition had been optimistic, Bogdanov saw the disorganization and chaos which resulted from a collision between organizations at first hand. Three years on, Bogdanov attempted to explain how the war had affected his theory.

'What tasks has the war placed before the collectives which have been plunged into it? The tasks of organization and disorganization in unbroken connexion: the same tasks, which tectology must study, and in the same relationship. But on what scale have these tasks been set? On a universal scale...'¹²²

Bogdanov analysed the differences between peace and war, concluding that the principal distinctions were war's greater seriousness, or tension (ostrota): mistakes cost large numbers of lives; and unpredictability - the constant sharp changes in the situation. There were crises in civilian life, also, but they tended to be brief. War, on the other hand, was a continually developing series of crises.¹²³ War posed an organizational task which was 'universal' and 'integral'.

'An inadequacy in men can be compensated for by the choice of terrain which is more favourable for their action, by reinforcing technical means, by an increase in destructive weaponry and defensive equipment [this was written in 1916, the tank being an obvious example of both] and by an ideological "lifting of the soul" [improving morale]... or, most often, by a combination of these methods. The same relates to elements of a completely different type: gaps in technology can be made up by expenditure of human life, a reduction

in the army's morale by withdrawal behind natural obstacles, and so on.

Of course, this relationship of exchange occurs during peace time. Using better weapons or machines, one can attain given results with fewer workers...¹²⁴

The comparison of increased automation in warfare and in industry was popular among Russian military writers in this period (see part 3). In the preface to the third edition, dated November, 1921, Russia's founder of systems thinking further addressed the question of the man-machine mix, a cardinal question in the application of systems thinking to the likely character of future war. He noted the confluence of 'historical necessity and scientific possibility',¹²⁵ of which the development of indirect fire systems(see below) and the tank might be considered classic examples. When a new machine was introduced, the organizer had the task of 'coordinating, that is organizing the activity of the workers with that of the machine, in an expedient fashion'.¹²⁶

The comparison between the military and industry also occurs in a work completed with I Stepanov, the Course in Political Economy. Here, the authors suggested that in economic life commercial considerations had limited the spread of automation and technical advance, but in the military sphere this had not occurred:

'The only area in which self-regulating mechanisms can be found is the military establishment, which is the sphere of destruction rather than production. In it the technical task controls the commercial one, and automatically regulated underwater torpedoes, aerial bombs and devices of that kind are already in use'.¹²⁷

Since this was published in 1919, it is certainly true that military technology has in some areas advanced faster than civilian, due to the absence of commercial (and industrial relations) constraints. Particular examples are strategic weapons and SDI. Bogdanov's view of the military sphere, the sphere of destruction, being

technology-driven is of fundamental importance in understanding military science.

The same work included some remarkable technological predictions. Coal was a 'limited and non-renewable' energy source. Instead, such 'enormous forces' as the tides, winds and storms might be utilised. Finally, 'work with energy and other phenomena...has opened up perspectives incomparably more magnificent than others: the internal energy of the atom'. Once such 'gigantic and cruel forces' were available to humanity, 'human collective control' would become inevitable.¹²⁸ The authors accurately predicted nuclear power and present attempts to harness wind and tidal power, while there are increasing signs of international cooperation to control and limit nuclear weapons and in the field of nuclear safety.

The attempt to impose some system, some order on the chaotic phenomenon of war is evident in all military organizations. One reason why 'military discipline', at every level, has to be so strict is that war is such a mess. In the Soviet Union Marxism-Leninism as a universal intellectual framework has played a particular role in seeking to systematise planning and preparation for war. However, the desire for organization, for a 'system' of views predates the Revolution: it is apparent from the body of late Imperial writing, which flowed over into Soviet times. There is a certain horror of chaos, evinced by Zherve in 1922, writing of the chaotic political twists and turns of the Napoleonic Wars in view of the uncertainty of his own times:

'...in spite of the lack of system (bezsystemnost'), and the kaleidoscopic quality of the changing political relations in that era, they were determined to a significant degree by the geographical conditions. Similarly, in the epoch through which we are living, in spite of all its exceptional character, geography, with a degree of stability, must show us those

enemies who, inevitably, because of their geographical situation, will be the most permanent participants in hostile political combinations, which Soviet Russia must prepare to fight.¹²⁹

This brief consideration of the relevance of Russian systems thinking to war thus leads once again to a major factor guaranteeing continuity between Imperial and Soviet planning for future war: geography, and also to geography as probably the most stable factor in the system.

7. REVOLUTIONS IN MILITARY AFFAIRS.

The influence of technology on warfare, the interaction of a number of technological changes, their assimilation and multi-faceted effect on tactics, operational art, strategy and military thought, has much in common with revolutions in science. As Thomas Kuhn pointed out in The Structure of Scientific Revolutions, the history of science is permeated by a number of apparent leaps or revolutions.¹³⁰ Kuhn argued that these were not usually the exclusive work of the scientist whose name is retrospectively associated with them (for example, the so called 'Copernican Revolution' in astronomy or the 'Einsteinian Revolution' in physics. Nor were they changes which took place overnight. Rather, they are what Kuhn calls paradigms. For Kuhn, a paradigm is a collective scientific achievement that embodies a collection of interrelated theories, laws, procedures and practices. The paradigm is thus the dominant theory, and institutionalized practice within the scientific community based on it.

Kuhn's idea of the paradigm is obviously most relevant to changes in ideas about the character of future war and institutional responses to it. Military science is not merely recondite theory, but is concerned with the application of ideas about the character of future war to the design, manufacture and distribution of weaponry, communications equipment and means of transport; to force

structures, to concepts of operations, to specific war plans, and to the way troops and their officers are trained, both in basic skills and the application of strategic. operational and tactical ideas in unfavourable, difficult and unexpected circumstances.

Lest it be thought that this represents an overly esoteric approach to the down-to-earth problems of coping with and assimilating changing technological and demographic conditions, it must be understood that the Russians approach such issues in precisely this way. As the second quotation opening this part shows, a journal as down-to-earth and preoccupied with technical detail as the Artillery Journal might begin an article on 'Artillery Questions' of the day (1896) with an astounding philosophical sweep: the need to look fifty years ahead.¹³¹

Many commentators on military history have, perhaps inadvertently, described changes in military theory and practice in precisely Kuhnian terms. Thus, Correlli Barnett noted that by the outbreak of World War I, three new factors had 'totally altered the terms of reference of warfare'.

'The first of these factors was the technological and military revolution represented by the magazine rifle, the water cooled and belt fed machine gun, smokeless propellants and quick firing artillery [the latter itself invoking a range of interrelated factors]. The second factor was the problem of supplying and deploying and directing unprecedented numbers of troops, and this was linked with the related problem of making the right military use of the latest inventions, the telephone, wireless, the internal combustion engine, the flying machine'.¹³²

This is a classic example of a Kuhnian paradigm. This mid to late nineteenth century 'revolution in warfare', the results of which were not fully apparent until well into World War I, is one of the most fascinating paradigm changes in military science. There is evidence of early

Russian awareness of the paradigmatic nature of advances in technology and their interaction with tactics, in Kuropatkin's account of the Russo-Japanese War:

'...this war was our first experience of smokeless powder, of quick-firing artillery, of machine guns, and of all the recent developments in the means of destruction, and much was strange and unexpected. Our preconceived notions were upset, and we were baffled by the deadly nature of indirect artillery fire, by the new attack formations - when advancing infantry is rarely visible...Our troops had been instructed, but what they had learned varied according to the personal idiosyncracies of this or that [Military] District commander.'¹³³

An even closer analogy with Kuhn's idea of the paradigm in science was the 'Revolution in Military Affairs', wrought by the advent of the ballistic missile and the nuclear warhead, in the 1950s' which, inter alia, called into question such profound assumptions as the relationship between attack and defence.¹³⁴ Closer because, unlike the nineteenth century 'revolution' which was subsequently identified by historians, the Revolution in Military Affairs had a precise and unambiguous significance at the time, among the scientific community involved - the Soviet military.

Another example of a paradigm in military science with which the Russian army was connected is the adoption of indirect fire technique by field artillery. The problems of cramming all the available guns onto the battlefield within visual range of the enemy, of assuring their survival in the face of the new long ranged and accurate rifles and machine guns, forced artillerymen to consider abandoning the old paradigm and to adopt concealed positions for artillery, in spite of all the technical (in the sense of technique) problems. Even when they had done so, the paradigm had not become accepted within the entire community: artillerymen who adopted covered positions for their guns were ordered forward onto

ridges by generals still unaware of the possibilities of indirect fire.¹³⁵ Once accepted, indirect fire in turn led to greater emphasis on air reconnaissance, accurate and up to date maps and new survey techniques. It made possible the dispersion of guns in depth as well as in breadth; the concentration on a target of all guns within range, over distances vastly greater than the range of the human eye.

Another paradigm change is of particular relevance to perceptions of the character of future war, from the 1920s to the present day. In his discussion of the change from the Newtonian to the Einsteinian paradigm in physics, Kuhn points out that for practical purposes Newtonian theory is still valid at low velocities.¹³⁶ In the case of physics, therefore, the new paradigm is affected by velocity: in the case of military science, it may be affected by scale. Thus, the Schlieffen plan for the invasion of France in 1914 derived from a traditional paradigm: encirclement of all the enemy's forces round an open flank. Schlieffen himself described it as a 'giant Cannae', recalling the pincer movement executed by Hannibal against the Romans.¹³⁷ But the scale was quite different, and this, combined with extensions in the range of weapons and troop deployments meant that the old paradigm did not work. The following year, Von Falkenhayn ruled out the possibility of encircling the vastly extended Russian front in the east. Instead, he would have to break through the centre and encircle outwards.¹³⁸ Thus, he created the precedent of the Gorlice-Tarnow operation. There were earlier precedents, but henceforward the new paradigm would dominate. As G S Isserson, one of the most prescient Soviet military visionaries of the interwar period put it, from now on, manoeuvre would not take place before the enemy deployment, in the sense of both time and space, as it usually had before World War I, 'but behind it, and in the enemy depth'.¹³⁹ This paradigm is most important in

considering the broad Soviet perception of the character of future operations. It becomes apparent that Military Doctrine, in Soviet parlance, is the current paradigm: no more, no less.

8. SOVIET DEFINITION AND CATEGORIZATION OF TYPES OF PREDICTION

In the context of foreseeing the character of future war, the word 'prognozirovaniye' - prognosis, prognostication - occupies a prominent place in Soviet sources. The Russian definition of prognosis is a 'prediction or statement on the further development of something, based on known facts already possessed'.¹⁴⁰ The need for a firm factual base is stressed repeatedly.

'I am not speaking of the pipe dreams of a Manilov [a character in Gogol's Dead Souls], but of coherent thought about development in this or that field of science based on what has already been achieved. Scientists' dreams constitute an incursion into a hitherto unexplored field, a scientific prognosis of the future. This can be very bold, but it must, above all, have solid foundations...The most difficult thing for the young is to restrain a flight from present day actual possibilities. For the dream to bear fruit it must have firm, sound roots.'¹⁴¹

Prognozirovaniye may be used to refer to 'long range forecasting'.¹⁴² A second term is 'scientific foresight', which also has something of the flavour of 'insight' - nauchnoye predvideniye.¹⁴³ It is applied to foreseeing the character of future war, especially if a particular element of prescience is involved, as in a recent article on Tukhachevskiy's 'predvideniya',¹⁴⁴ and in the article on Svechin's predvideniye which also suggests far-sightedness with regard to Svechin's understanding of the value of the satrategic defensive and its relevance to current Soviet thinking.¹⁴⁵ The term can also be used in the sense of foresight on a day-to-day basis: the effective officer or manager's need to anticipate problems

and develop solutions before they arise. In the military context 'scientific foresight' therefore has two distinct meanings: foreseeing the character of future war as a framework for procurement and planning, and 'foresight' in the immediate operational context, as part of effective command.¹⁴⁶ One of the most prominent Soviet experts on this question in the 1960s and 1970s, V Konoplëv, discussed the two variants side by side in 1966.

'Forecasting (prognozirovaniye) in military affairs ...is based on the study of economic, moral-political, natural scientific and directly military factors and their interaction. nowadays it is impossible to command forces successfully without a mastery of the principles of physics, mathematics, and other sciences, without a strong knowledge of military theory and practice, without a deep appreciation of the essence of the revolution in military affairs and its consequences...

The sum of knowledge necessary to produce a picture of future combat and of an operation scientifically must correspond to the position of an officer, of a general, in the hierarchy. A junior commander establishing a perspective on an impending (predstoyashchiy) battle needs a specific knowledge of the technical and tactical characteristics of enemy weaponry, of [the organization of] his units and sub-units. A powerful commander-in-chief, resolving a task on a strategic scale, and even more one who is establishing a perspective on the course and outcome of the war as a whole, needs, alongside a knowledge of the military characteristics of modern weaponry, a deep knowledge and ability to take account of the military-economic potential, social-political and geographical characteristics of a country, of a theatre of military operations (TVD)'...

The commander, foreseeing the future picture of the battle, carries out his reconnaissance directly on the ground where the action will take place... In strategic foresight a logical methodology plays an important role. At present, the commander is acquiring more and more the opportunity to use modelling of possible military actions, even the war, as a whole, for purposes of foresight'.¹⁴⁷

Konoplëv expanded his arguments in a book, Scientific

Foresight in Military Affairs, published in 1974.¹⁴⁸

The third main term encountered is 'scientific and technical progress', which embodies the whole process of scientific, technical and technological innovation and its social and economic consequences.¹⁴⁹ The word predskazaniye ('foretelling') is usually reserved for seers, fortune tellers, readers of tea leaves. It might be translated 'prophecy' or 'prediction', although it has occasionally been used in the context of scientific prediction.¹⁵⁰

Chuyev and Mikhaylov's 1975 book Forecasting (Prognozirovaniye) in Military affairs briefly discusses different authors' definitions of various terms before establishing its own definitions. Prediction (predskazaniye) is 'the art of weighing the future state of an object, based on the subjective "weighing" of a large number of qualitative and quantitative factors'.¹⁵¹ In fact, this constitutes an acceptable definition of predvideniye (foresight), also.

Forecasting (prognozirovaniye) is a research process, as a result of which probability data about the future state of the object being forecast is obtained.¹⁵² As with Konoplëv's book of the year before, the authors also establish the important difference between forecasting and planning. Konoplëv had defined a prognosis as the first phase, involving a scientific appreciation of perspectives of social development, and a plan as the second phase involving active creative work by individuals. Whereas a prognosis had a primarily 'cognitive' function, a plan regulated and directed the established relations between people, organizations and social systems.¹⁵³ Konoplev drew on the seminal work by I V Bestuzhev-Lada, Window on the Future (1970)¹⁵⁴. Bestuzhev-Lada is one of the elder statesmen of Soviet forecasting. Of particular interest is the short book If the World Disarms (1961), in which he examines the character of contemporary war,¹⁵⁵ and then

options open for spending the money on other things: gigantic nuclear powered locomotives travelling at 200 to 300 kilometres per hour on tracks three times as wide as the standard Russian/Soviet broad gauge, a network of tunnels and canals criss-crossing the planet.¹⁵⁶ These views are particularly interesting in the light of debates current at the time of writing, on conversion of military industry and the 'peace dividend'.

In *Window on the Future* (1970), Bestuzhev-Lada outlines 14 types of forecasting,¹⁵⁷ divided into three categories: negative, intermediate and positive. Negative types of forecasting include the 'Presentist', 'Agnostic' and 'Nihilist'. Intermediate forms are 'Religious', 'Fantastic' and 'Utopian'. Positive forms of forecasting are the 'Intuitive', 'Philosophical', 'Prognostic', 'Constructive' and 'Science Fiction'. He deals with the 'Scientific-Technical Revolution' and forecasting, focussing on the period from the late 1940s to the early 1960s as the crucial one for the development of modern scientific forecasting methods.¹⁵⁸ The XX Soviet Communist Party Congress encouraged 'Social forecasting', in which context the works of, inter alia, Glushkov and Siforov were mentioned. Bestuzhev-Lada also deals with military affairs,¹⁵⁹ which he considers 'most closely linked with political forecasting', reinforcing the authority of Military Doctrine as divided into political and military-technical segments. He cites an interesting prediction by Gordon O Helmer (1964) which it is possible to test against actual developments in the last quarter century. Helmer predicted(and one assumes that the Soviet military took some note) automatic location and destruction of nuclear submarines by 1975 (which did not occur), and development of methods for submarines to evade this by 1980, (not a bad prediction, as by 1980 Soviet submarine designers had paid much attention to anechoics and methods of making submarines very hard to detect).

Effective laser weapons were forecast by 1989, a prediction which proved absolutely accurate. At the time of writing, laser weapons exist which are certainly effective against 'soft' targets, eg., optics(see part 4). The ability to hypnotize enemy forces over an entire zone of military operations is forecast by 2035, and mind-reading by 2045.¹⁶⁰ Although it is difficult to confirm, Soviet interest in the area of 'reflexive control' suggests this may indeed be a long term objective.¹⁶¹

Finally, Bestuzhev-Lada deals with space exploration: the exploration first of space near the earth, then the moon and nearer planets, the solar system as a whole, then extending beyond the solar system to other stars, galaxies and making contact with other civilizations.¹⁶²

Chuyev and Mikhaylov similarly differentiated between a prognosis, which establishes 'what may occur in the future and under what conditions', and planning (planirovaniye) which 'determines what is supposed to occur in the future'.¹⁶³ The character of future war is primarily determined by forecasting and foresight, but planning for specific operations and actions must also determine, and be determined by, its character.

Prognozirovaniye, 'forecasting' or 'long range forecasting', has been more heavily emphasized recently.¹⁶⁴ In the military context, it has evolved in two directions. The first is the operational and technical, involving the appraisal of new weapons systems, both Soviet and non-Soviet, and the optimisation of Soviet(and allied) force structures. The second is more general military-political and environmental forecasting.¹⁶⁵ In a significant article in 1976 General V Kulikov demanded greater effort on the latter from the scientific research groups in military academies and schools, involving the development of predictive techniques which would assist in military planning.¹⁶⁶ There is some confusion about the precise nuance of

prognozirovaniye and predvideniye, and they can be used as synonyms. General Cherednichenko described the former as a 'form of scientific foresight'.¹⁶⁷ This semantic problem therefore mirrors the problem of distinguishing between 'future' and 'contemporary' war. Even more recently (1987) E A Rybkin discussed Lenin's views on the social consequences of wars and the problems of forecasting them. Within this section he discussed predvideniye.¹⁶⁸

'Foresight - this is a special aspect of human knowledge about what exists, but which is not yet encompassed in our experience, which exists only as a possibility, and disposes of an established degree of probability, of being converted reality in a defined period of time...attempts at scientific foresight took place in the past but nevertheless it only acquired a firm base with the appearance of Marxist-Leninist theory. In this, one must also, of course, not minimise the attainments of the hard sciences (konkretnye nauki) (that is, the theory of probability, statistical research, in revealing tendencies in the development of events)...'¹⁶⁹

Lenin sought not only to explain the past, but also to use data in the context of 'fearlessly foreseeing (predvideniye) the future and bold practical action directed towards its realisation'.¹⁷⁰ Rybkin noted that Lenin particularly valued 'the prognoses of F Engels on a future world war, its result and consequences, and on the nature of revolutionary crises which would arise in future as a result of wars'.¹⁷¹ The three most important components of 'foreseeing possible future wars', according to Rybkin, are their social character, their cause and consequences.¹⁷²

Moving to the military-technical character of future war, and its influence on force structures, procurement and technological development, there was evidence of a great and growing interest in the military applications of forecasting in the 1970s. Planning might be conducted on a five year basis, updated annually, with long term

forecasting reaching ahead for some 15 to 20 years. Any greater span required prediction about scientific progress in its own right.¹⁷³ In 1972 Captain Skugarëv noted foreign classifications of short term forecasts (kratkosrochny prognoz) as not exceeding five years, medium term forecasts (srednosrochny) as between five and ten and long term (dolgosrochny), exceeding ten years and extending to 20 years and more.¹⁷⁴ In 1974, Major General Konoplev confirmed the definition of long term forecasts, while defining medium term as from three to ten years and short as one to two years.¹⁷⁵ Some Soviet forecasting experts have stressed the need for longer predictions, (sometimes defined as dal'niy - 'distant') from 50 to 100 years.¹⁷⁶ Short-term forecasts, for example, of the weather, are expected to be very precise: the longer the term, the more vague the forecast may be.¹⁷⁷ As the Soviet General Staff noted in 1989, Military Science forecast 10-20 and 20-30 years into the future, but their 'long-range forecasts' were 'quite vague'.¹⁷⁸ The 'distant' future appears to embrace the period from 30 years hence, and 'distant forecasts' from 25 to 30 years hence.¹⁷⁹

The use of the term 'short term forecast' (prognoz) at first sight contradicts the conclusion that prognozirovaniye should be translated 'long term forecasting': it reinforces the view that prognozirovaniye and prognoz can have a rather general meaning. The term 'short term forecast' (prognoz) reappeared in the appropriate chapter (probably also by Skugarëv) of the book edited by Gorshkov in 1988,¹⁸⁰ indicating that this was not just an idiosyncratic and temporary slip.

Horizons for forecasting are closely connected with the time it takes from the initial conception of a new machine to its entering service, the 'lead time'. In 1969, a Soviet economist fixed this time, 'from the retort to the [disposal] tank', at 12 to 15 years. He therefore

suggested that 20 year prognoses were 'inadequately firm', and that 12 to 15 years was the optimum.¹⁸¹ When the idea for a new manufactured item is conceived, this takes place on the basis of the level of science and technology at that time. So, if the Russians are looking more than 12 to 15 years ahead, it stands to reason that there must also be some forecasting of changes in the scientific and technological background. Therefore, a 25 year forecast requires a 10 to 15 year forecast of technology in various sectors of the community, a view confirmed by the Central scientific Research Institute of Patent Information.¹⁸² Similarly, in the context of forecasting 100 years ahead, 20 to 30 year forecasts of general scientific and technological development are the minimum or, conversely, such 20 to 30 year forecasts enable us to predict much further ahead, although 100 years is 'unusually difficult'.¹⁸³ Forecasting the general development of science and technology is a specialised area of study, separate from but related to the specific issue of predicting the character of future war and the development of specifically military systems.¹⁸⁴

The problem of predicting the pace of scientific development itself acquires a particularly high profile in the case of naval armaments, where large surface combatants may be in service for 30 to 35 years, aircraft carriers for more than 45, and armament systems for 15 years.¹⁸⁵ This necessitates 'forecasting and planning of the development of the fleet over a long term period, an integrated analysis of factors, influencing its development, and missions, arising from an evaluation of the development of the international situation, and the scientific-technical and economic potential of the state'.¹⁸⁶ The method for forecasting the development of armaments has its basis in historical and dialectical materialism, and is shown diagrammatically in figure 2.3 which is taken from Gorshkov,¹⁸⁷ as is figure 2.4 which

Figure 2.3. 'Interrelationship and subordination of methods of prognosis with other methods of cognition'
(Source, Gorshkov et al., The Navy..., p. 50.)

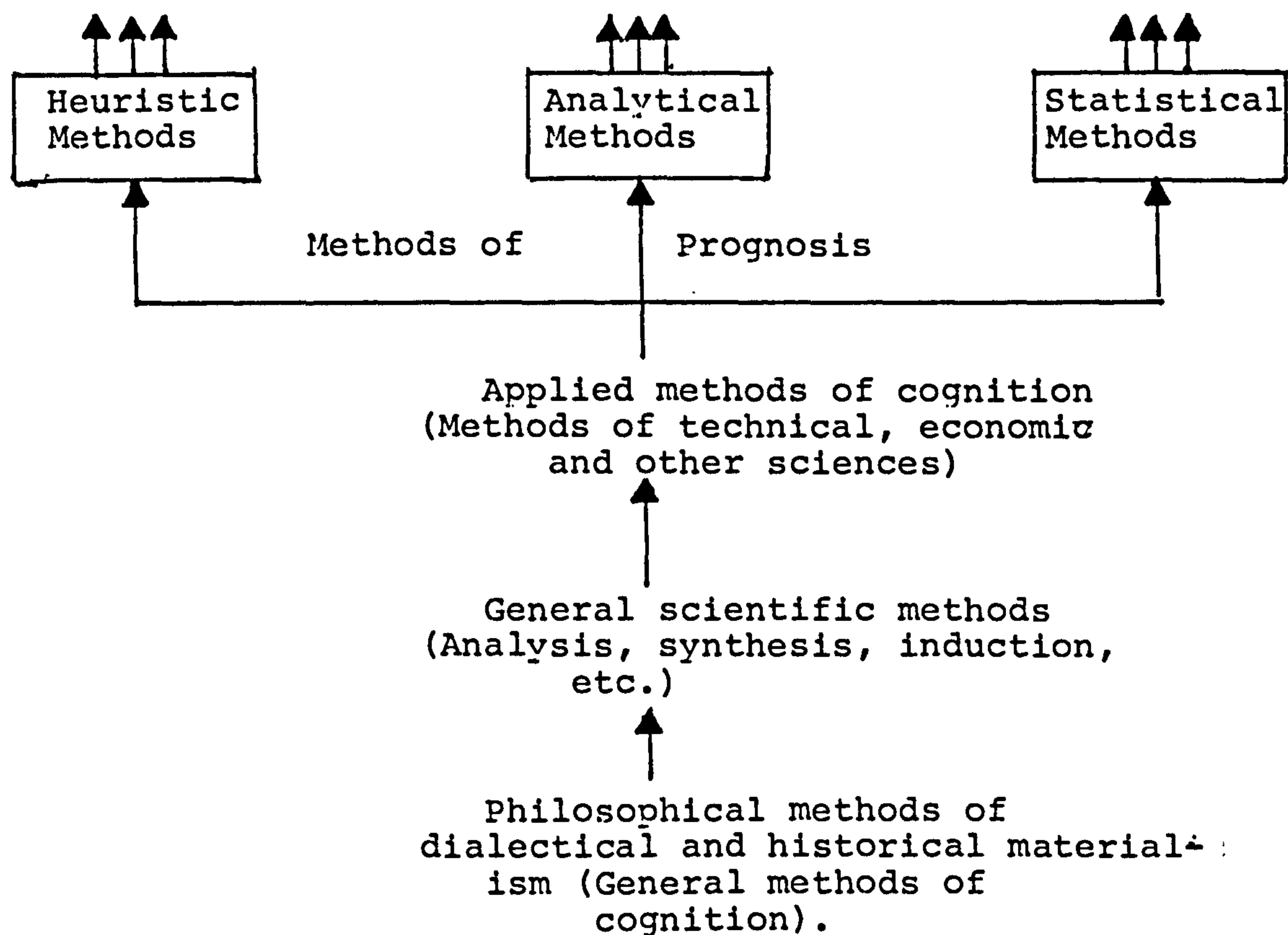
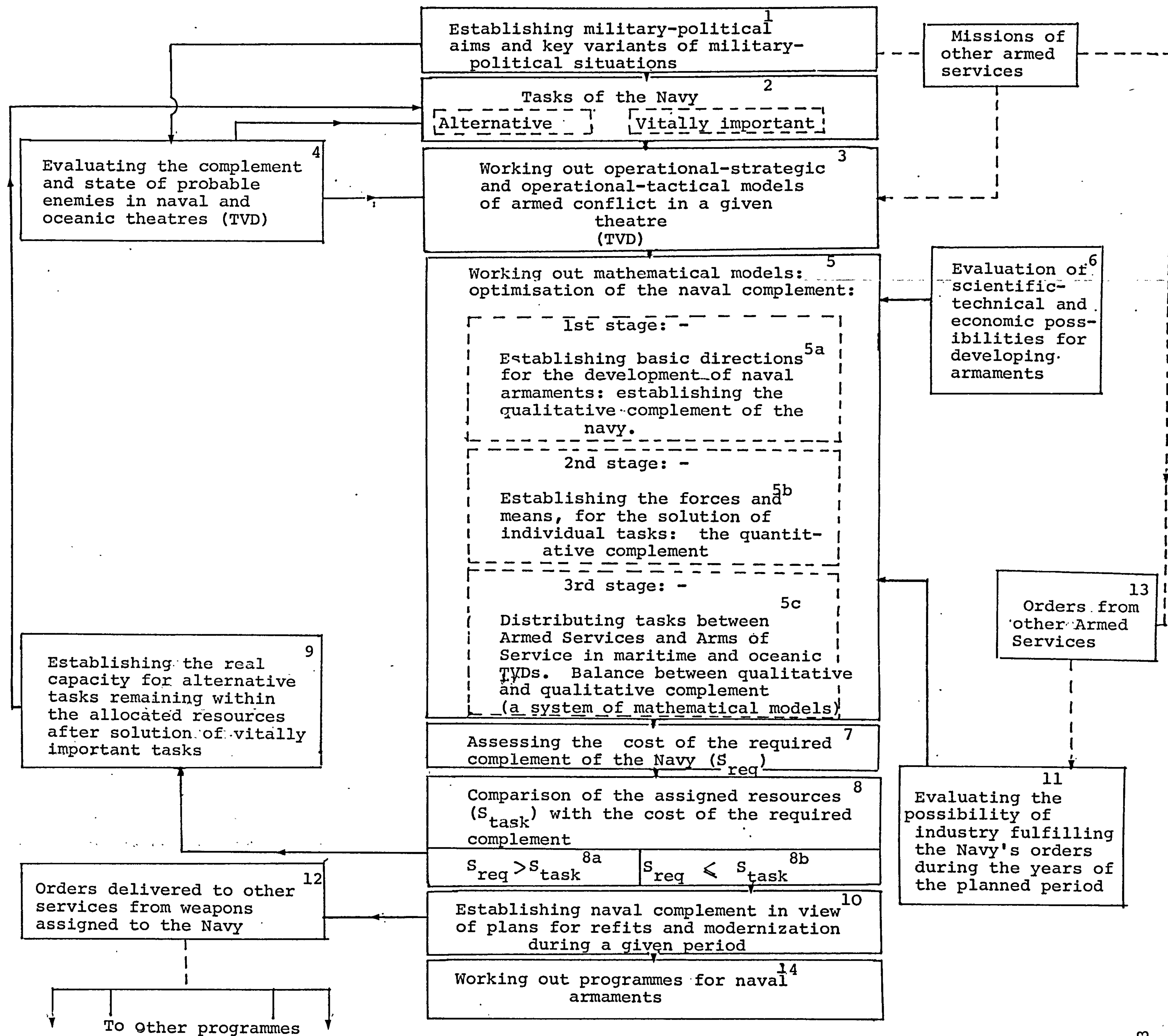


Figure 2.4. Interrelationship of Forecasts and Plans for Constructing Naval Armaments According to the Principal Phases of their life cycle (Source, Gorshkov (1988), p. 61.

Type and parameters of forecasts		Type and parameters of plans	Phases of building and utilizing naval armaments and their development period						
Long term 25-30 years		Long term plans and programmes for constructing armament systems 20-25 years	Fundamental and theoretical research 15-20 years	Applied Research 10-15 years	'Project construction' and technological work (Development) 4-8 years	Series Production	Exploitation	Modernisation	
Medium term 15-20 years		Ship building programmes and plans for constructing armament systems 10-15 years	Applied Research 10-15 years	Development 4-8 years	Series production	Exploitation	Modernisation		
Short term 5-10 years		Plans for Development 5 years	Development 4-8 years	Series production	Exploitation	Modernisation			
Current 1-5 years		Current plans 1-5 years	Series production	Exploitation	Modernisation				

Figure 2.5. Basic chart establishing perspectives for the development of naval armaments



Source: Gorshkov, ed., V'yunenkov, Makeyev, Skugarev, *The Navy...* figure 2, pp. 68-69, translated and interpreted with the help of the more detailed explanation in the text, pp. 70 - 81. This is a more elaborate version of the diagram in Makeyev's article in MSb 4/1982, p. 28, which was also used in interpreting the later diagram.

Box 1 would appear to coincide, more or less, with the political character of future war: boxes 2-4, with the military-technical character. Together, they form a largely self-contained system which then drives naval (and other armed forces') procurement.

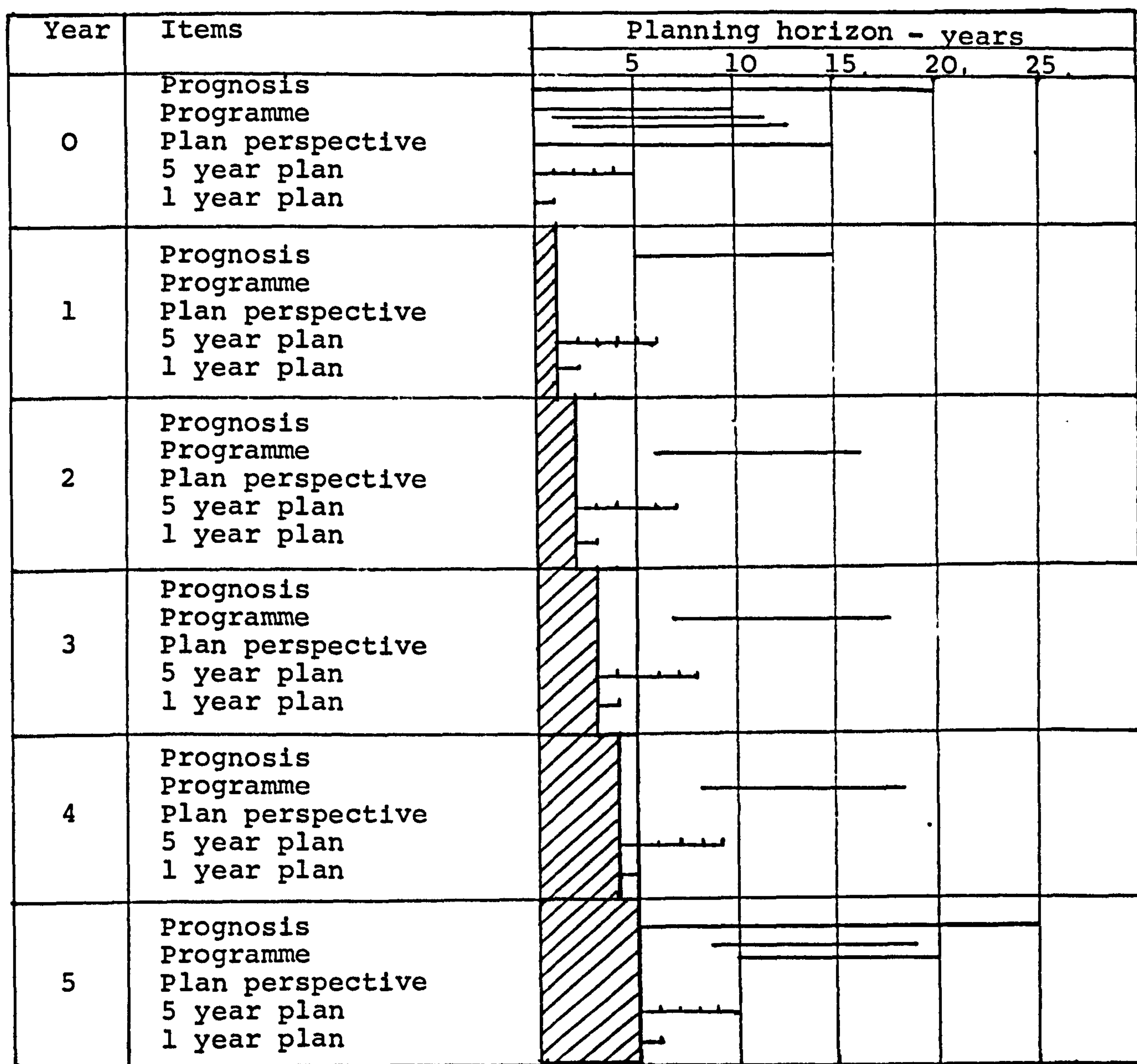


Figure 2.6. Connection between the horizons of prognoses, programmes and plans

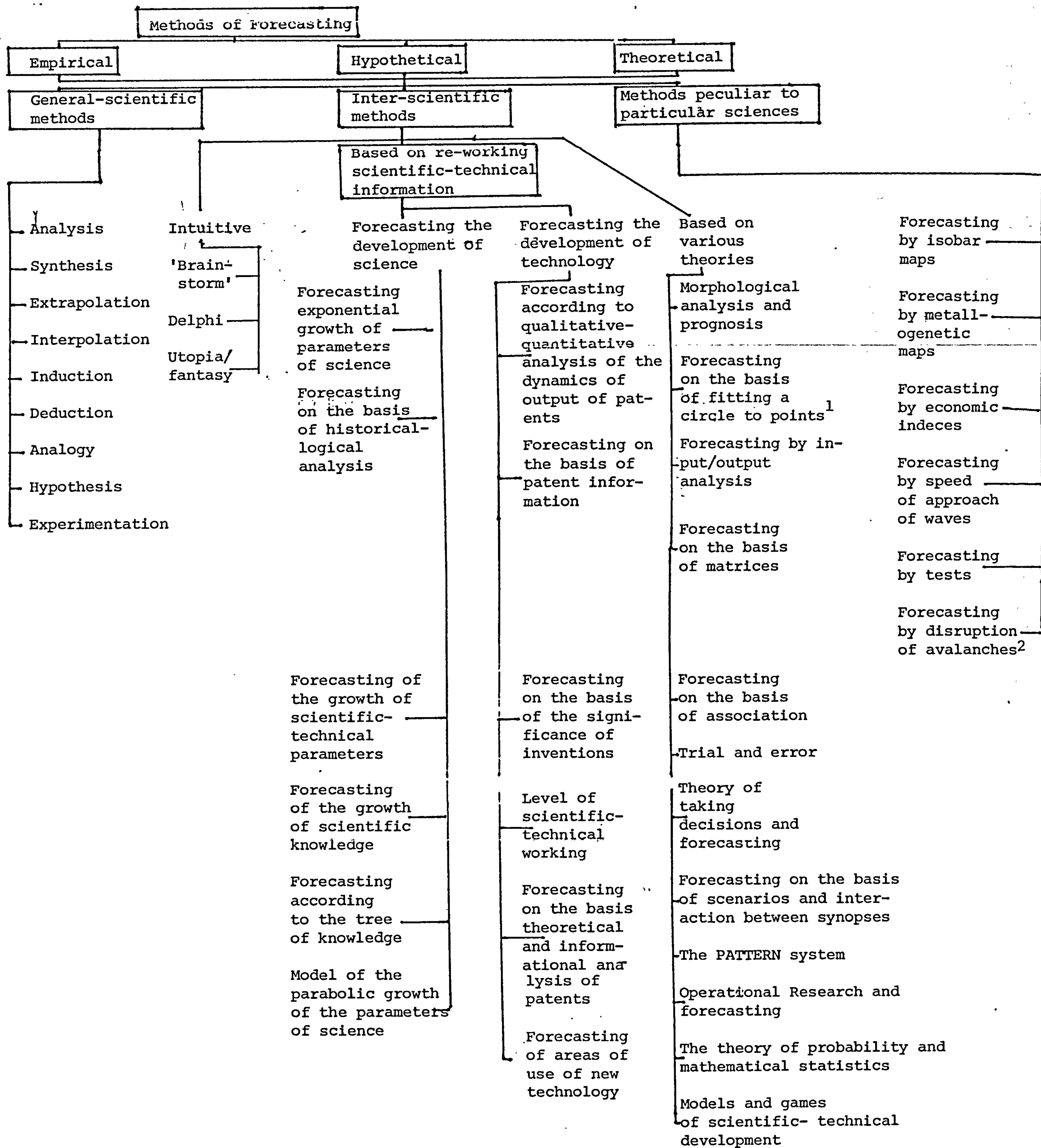
Prognosis = correlation of forces, economics, technology, foreign trade

Programme = 3 parts: plan to be carried out flexibly and with variations, in about ten years

Perspective = is absorbed into the programme by the fifth year and so it disappears

Source: Wacław Stankiewicz, Planowanie obronne (Defence Planning), (Defence Ministry Publishing House (Wyd. MON), Warsaw, 1977), fig. 15.

Figure 2.7. Different methods of Forecasting (Source, Bestuzhev-Lada, Okno v Budushcheye, 1970, Table 1, pp. 66-67).



1. Ogibayushchikh krivyykh

2. Sryv lavin - presumably 'avalanche' here is used in the sense of an electronic avalanche.

sets long term forecasts in this context at 25 to 30 years, medium term at 15 to 20, short term at 5 to 10 and 'current' at one to five years. Establishing the precise timescales covered by different types of forecasts is informative about Soviet views of future war, but it is also necessary to understand the institutional relationships and the relation of naval armaments to perceived future tasks. Figure 2.5, which appeared in Gorshkov is an amended version of a diagram from Captain Makeyev's article of 1982.¹⁸⁸ It shows the relationship between naval armament programmes and military political aims and the missions of the Navy, and also the relationship with other services.

The character of planning and programmes is also apparent from a Polish book on Defence Planning(1977). The process is cyclical over a five year period, as illustrated in figure 2.6. In the first year the prognosis looks forward some twenty years from that time. Simultaneously, a programme, divided into three parts, looks forward ten, and is intended to be fulfilled with some flexibility and variations in that time. There is also a fifteen year 'plan perspective', a five year plan and a one year plan. During the next four years the prognosis is retracted to look fifteen years hence, but updated annually. After five years the cycle begins again, the prognosis looking forward 20 years from the new present, or five years further than the previous one.¹⁸⁹

Forecasting and prediction techniques in the Soviet Union now appear to be highly developed, although much has been garnered from foreign work on the subject. Bestuzhev-Lada remains the most prominent figure in the general field: that Soviet forecasters use a highly synoptic approach is apparent from figure 2.7 which shows a broad and integrated system of knowledge and methodology.¹⁹⁰ Since the mid-1960s there has been increased emphasis on mathematical modelling and increased

adoption of western methods. Whereas there was 'no indication of Soviet use of the Delphi method by 1966',¹⁹¹ it was described extensively in publications of 1969¹⁹² and 1974,¹⁹³ and it would be surprising if the Russians had not drawn lessons from it. The Programme Evaluation and Review Technique (PERT) method, described as 'net (setevye) models of planning and control of the production and economic process', was also mentioned at this time.¹⁹⁴

Following from this, it is clear that the character of future war is no mere science fiction - nauchnaya fantastika - but a scientific and reasoned analysis founded on known trends: scientific, technological, social, political, demographic, economic, and on experience of past and current conflicts. Nor is it the preserve of a few dreamers or self publicists. According to Kir'yan,

'A superficial analysis... in modern war conditions will result in errors... to solve these problems a system of organs is created, which is concerned with prognosticating the possible character of future war and problems connected with it. It embraces General Staffs and the headquarters of the Armed Services, and also other military organizations: corporations, commissions, institutes, societies, centres. Various technical means for predicting situations which arise in operations have been created which play out the various decisions which may be taken in order to establish the most expedient (optimum) one.'¹⁹⁵

The role of the Military Academies,¹⁹⁶ is cardinal to this thesis. These are centres of higher military education, equivalent to 'staff' or 'War' Colleges in Britain and the United States, and not institutions which prepare young men and women for junior officer appointments like the 'Academies' of Sandhurst and West Point. The choice of the name 'Academy' was contested by Jomini, who believed that the title 'Military Academy' was 'ordinarily' only given to establishments uniting all the

aspects of Military Science, and should not be applied to specialised schools'(as in the 'Artillery Academy', and so on).¹⁹⁷ However, he declined to get involved in this 'guerre de mots', and the title Academy stuck, for the war colleges of the various arms and services as well as for the Frunze and General Staff Academies, which fulfil Jomini's criteria.¹⁹⁸

In the Soviet Union and allied states the Academies perform two distinct but interrelated functions. The first is preparing higher commanders for their duties in peace and war. The second is to act as what were described in 1986 as 'scientific centres for the research of military problems',¹⁹⁹ or, to use the fuller 1928 definition,

'Scientific laboratory centres moving the theory and practice of military affairs forward. The work of Red Military Academies is quite different from analogous establishments in bourgeois armies'²⁰⁰

As noted in part 1, the process of turning the General Staff academy into a 'think tank' concerned to a large degree with the character of future war was underway before World War I,²⁰¹ and the Red Army Academy retained this objective.

The Soviet General Staff itself (before 1935, the Shtab RKKA: Red Army 'Staff', or Headquarters),²⁰² has also been immersed in establishing the character of future war. As explained, the phrase 'Military Science' and the character of future war are virtually inextricable. In Zakharov's work on The General Staff in the Pre-War Years (1969, published 1989),²⁰³ Lenin's views on foresight are taken as the basic text for the chapter on strategic direction and military science. Military historians, said Lenin, must study the experience of wars

'not only with the thought of explaining the past but also of fearlessly foreseeing the future and bold practical activity, directed towards fulfilling this [vision].'²⁰⁴

The General Staff's military-historical department, in

addition to historical research, and in connexion with it, 'devoted unwavering attention to working out views and prognoses on the character of future armed conflict. In this regard, the credit (zasluga) rightly belongs to the General Staff, as the three volume History of Wars and Military Art bears witness.'²⁰⁵

Recent conversations with the Soviet General Staff, underline the continued leading role of that organization, and its Academy, in formulating the view of the character of future war(see part 4). The latter appears to be a defined concept with a particular place in the intellectual framework of Soviet military thought, as this part of the thesis has demonstrated. It is also clear that a well organized and defined structure has existed, and exists, in Russia and the Soviet Union, for formulating, disseminating and utilising a vision of the character of future war.

NOTES TO PART 2

1. Nikolay Ostrovskiy, Na vsyakogo mudretsa dovol'no prostoty, Act III, sc. 4. The play was written from August to October, 1868, and first published in Otechestvennye zapiski (Homeland Notes), 11/1868. A N Ostrovskiy, Sobraniye sochineniy (Collected Works), (Khudozhestvennaya literatura, Moscow, 1960), Vol. 5, p. 302 and note on pp. 527-28. 'My ne mozhem, ne dolzhny bez strakha podnimat' zaves' budushchego...'
2. A Baumgarten, 'Artilleriyskiye voprosy' ('Artillery Questions'), Artilleriyskiy zhurnal (AZh), 1/1896, pp. 1-32, this p. 1.
3. Marxism-Leninism on War and Army (Marksism-Leninism o voyne i armiyey) was published in five Russian language editions beginning in 1957 and ending in 1968. An earlier edition was nominated for the Frunze prize in 1966. The 1968 edition was translated into English and published by progress Publishers, Moscow, in 1972. This is taken from the edition published under the auspices of the US Air Force, US Government Printing Office, Washington DC, 1978, p. 2, Introduction to the Russian Edition.
4. Lewis Mumford, Technics and Civilization, (Routledge, London, 1934), p. 58, citing Bacon's Opus Majus.
5. I F Clarke, 'The First Forecast of the Future', Futures, June, 1969, p. 325. On Clarke and futures studies, see part 1 note 40.
6. Mumford, Technics and Civilization, p. 59.
7. Following the Montgolfier brothers' flight, in 1784 Benjamin Franklin, then US ambassador in France, wrote 'where is the prince who can afford to cover his country with troops for its defence [against]... 10,000 men descending from the clouds', an unwitting prediction of the surprise value of airborne forces. Clarke, 'The First Forecast...', p. 329.
8. Clarke, 'Forecasts of Future Wars, 1871-1914', p. 553.
9. See for example, The Time Machine (1895) and The First Men on the Moon (1901) and, particularly in the future war context, War of the Worlds (1898), War in the Air (1908), The World Set Free (1914). On the methodology of forecasting, see H G Wells, The Discovery of the Future. A discourse delivered to the Royal Institution on January 24, 1902 (T Fisher Unwin, London, 1902), in which Wells compares and contrasts our awareness of past and future and suggests that social and political development might be forecast in just the same way as chemical

combinations. A more down to earth future war prediction occurred in three articles published in the Daily Mail, April 7, 8 and 9, 1913, reprinted as War and Common Sense, (London, 1913) in which Wells questioned the utility of vast conscript hordes and the ability of the available breadth of front to absorb them, thus predicting the stasis of World War I. The War that will end War (Frank, Cecil and Palmer, London, 1914) and What is coming, a Forecast of Things after the War, (Cassell, London, 1916) are also exemplary. In the former, Wells forecasts massive Russian cavalry raids on the eastern front (p. 17), which were considered, and also the need for Russia to liberalise in order to cope with modern military technology (p. 66). In the latter he begins with a chapter on the methodology of forecasting before moving on to specific predictions.

10. Wells met Lenin on 6 October, 1920 and Stalin in 1934. See the entry in Bol'shaya Sovetskaya Entsiklopediya, Vol. 27 (1927), pp. 218-19, and Stalin-Wells talk. The verbatim Record and a discussion by George Bernard Shaw, H G Wells, J M Keynes, Ernst Toller and others, (New Statesman and Nation, London, 1934). Lenin also wrote to Wells, who apparently called him 'the Kremlin's dreamer'. Goushev and Vassiliev, Russian Science in the 21st Century, p. 3.

11. Goushev and Vassiliev, p. 8.

12. Clarke, 'Methods of Prediction 1918-39', p. 375.

13. Ibid., pp. 375-76.

14. Giuseppe Grassi, compiled, corrected and edited, Opere di Raimondo Montecuccoli, (Stampa di Giuseppe Favale, Torino, 1821). Libro terzo, Aforismi applicati alla guerra possibile col Turco in Ungheria, pp. 101-215 and bibliographical note on pp. 301-02. The manuscript including these aphorisms probably dated from 1685-95, although a geographical survey of Hungary which follows the Aphorisms (p. 219) is dated 1673. Montecuccoli's Aphorisms display a classic structure common to many 'future war' predictions: Chapter I (Capitolo I) begins with 'Della guerra e del suo apparecchio' (How the war might break out - the political component); notes on the organization of forces (Del soldo e delle reclute), which included a strong argument for standing regular professional troops- un esercito perpetuo (p. 115). In this, Montecuccoli pointed out that wars tended to last a long time: the war against the Turks begun in 1661 did not finish until 1664, and so on. The geographical survey which follows also forms part of the 'future war' assessment: the key discipline of military geography.

15. Niccolo Machiavelli, The Art of War, trans. of Arte della guerra [1521], (revised edition of the Ellis-Farnworth trans., introduction by Neal Wood, Bobbs-Merrill, Indianapolis, New York and Kansas, 1965). He paid great attention to the Roman legion, whilst not rating artillery at all. In addition to the lessons of recent wars, Montecuccoli noted that the Turks' artillery was excessively cumbersome and that his forces, with newer and more mobile artillery, enjoyed a technological advantage (Grassi, ed., Opere, p. 101, and Capitolo I, Titolo II, dell'artiglieria, pp. 158-9).

16. See for example General G A Leyer, ed. Entsiklopediya voyennykh i morskikh nauk (Encyclopedia of Military and Naval Sciences), (8 Vols., St Petersburg, 1883-1897), Vol. 2, pp. 196-99. 'Military Geography' and 'Military Statistics' are classified as 'a separate branch of military knowledge concerned with the study of countries and states from a military viewpoint' (p. 196). Leyer lists an extensive bibliography of military geographical works, mainly in German and Russian, going back to 1801. In the first half of the 19th century Military Statistics was concerned only with numbers and organization of forces (p. 198). Colonel P A Yazykov's Opyt teorii voyennoy geografii (Experience of the theory of Military Geography) (1838) and the then Colonel D A Milyutin's Pervye opyty voyennoy statistiki (First Experiences of Military statistics) (1847) are given as the earliest Russian endeavours in this field. Both Yazykov and Milyutin had been professors at the Nicholas Academy of the General Staff (founded 1832) underlining the link between this organization, the requirements of teaching future commanders and staff officers and the formulation of an image of future war. Milyutin's approach to Military statistics went further: 'to research at a given moment the forces and equipment (sily i sredstva - the same terms as are used today) of states from a military viewpoint'. Thus, 'Military Statistics' formed the basis of assessing a state's entire war making potential and, by extension, the way it was likely to perform. These were distinct disciplines from Military Science which (p. 229) Leyer's Encyclopedia defined as divided into Tactics, Military administration, Artillery, Military Topography, Fortification and also, as a 'separate branch' (otdel'naya otrasl'), Strategy.

17. See for example 'Nyneshnee chislitel'noye sostoyaniye voysk yevropeyskikh derzhav' ('The present numerical strength of European Powers'), Voyenny zhurnal, (Military Journal), No 1, St Petersburg, 1835, p. 121, and a military geography of Great Britain and Ireland in Voyenny zhurnal, No 3 (1839), p. 107. During the Crimean War, 'Military Statistics' embraced intelligence assessments of enemy forces: 'Noveyshaya svedeniya o Velikobritanskoy armii'

('The latest information on the British Army') in the section 'Voyennaya statistika', Voyenny zhurnal, No. 2, 1854, pp. 1-10, for example. On the development of intelligence assessments, see C D Bellamy, 'British Views of Russia: Russian Views of Britain', in P A Towle, ed. Estimating Foreign Military Power, (Croom Helm, London, 1982, pp. 37-76.

18. See for example Rear Admiral Bowles, Thoughts on National Defence (1848); General Sir John Burgoyne, Observations on the Possible Results of a War in France, (1852); Captain Robert Fitz-Roy, On the Application of Steam to Ships of War (1835), G V Gustafson, Observations on the Steam Navy of Great Britain (1847). First steam powered ship: exhibit by Dumfries and Galloway College of Technology, Glasgow, 1988. On the reluctance to take steam power for ships of war seriously before the 1830s, John F C Fuller, Machine Warfare. An Enquiry into the Influences of Mechanics on the Art of War, (Hutchnison, London, 1942), p. 30.

19. Colonel-General F F Gayvronskiy, Evolyutsiya voyennogo iskusstva: etapy, tendentsii, printsipy, (The Evolution of Military Art: Stages, Trends, Principles), (Voyenizdat, Moscow, 1987), pp. 83-84.

20. Karl von Clausewitz, On War, (Vom Kriege), ed. and trans. Michael Howard and Peter Paret, (Princeton University Press, 1976), Bk. 2, ch. 1, p. 127.

21. Baron Antoine Henri Jomini, Précis de l'Art la Guerre, second edition (the first was addressed to the Russian Tsar Alexander I on 6 March, 1837), (1-ère Partie, Librairie pour les Arts et les Sciences, Paris, 1855). See also the translation by Captain G H Mendell and Captain W P Craighill, The Art of War, (Lippincott, Philadelphia and Trubner, London, 1879), which includes Appendices written after the Crimean War. In particular, ch.2, article 13, pp. 48-49, in which Jomini forecast the reappearance of armour in response to increased firepower and Appendix 2, p. 355, on the inevitable dissemination of technology. On correspondence with Milyutin, part 1, notes 25, 60, and Egerton MSS 3168, ff. 44-49, on his involvement in such detailed matters as the courses at the Russian military-educational establishments.

22. 'Lifting the veil of the future' (perhaps a reference to Ostrovskiy - see note 1) in Meshcheryakov, Russkaya voyennaya mysl' v XIX v (Russian Military thought in the 19th Century), (Nauka, Moscow, 1973), p. 120, 'eto byla pervaya popytka priotkryt' zaves' nad budushchim', referring to N D Neyelov (1800-1850), Ocherk sovremennago sostoyaniya strategii, (Sketch of the Present State of Strategy), 2 Vols., (St Petersburg, 1846, 1847). Meshcheryakov

cites this as published in 1849 although the only edition traced by the author is from 1846-7. Neyelov, then a General Staff Captain, is extremely cautious and shows little originality, citing Jomini and Medem constantly. Even the sections on operational and strategic lines refer only to ordinary roads, not railways. However, an article translated from Journal des Sciences Militaires appears in Russian in 1846; Secretary Turunov, trans., 'Vzglyad na zheleznnye dorogi kak na voyennyya operatsionnyia linii' ('A Look at Railways as Military-Operational Lines'), VZh, 4/1846, pp. 47-86, 5/1846, pp. 109-71. Neyelov also wrote Opyt opisaniya Borodinskago srazheniya, sostoyashchego pri shtabe 6-go pekhotnago korpusa (Attempt at a Description of the Battle of Borodino compiled in the Headquarters of 6th Infantry Corps) when a General Staff Lieutenant, (N Stepanov Press, St Petersburg, 1839).

23. Edwin A Pratt, The Rise of Rail Power in War and Conquest, 1833-1914 (P S King & Son, London, 1915) is the best work on the military revolution created by the railway. 1849: pp. 8-9. A near contemporary Russian source, Opisaniye voyennykh deystviy Rossiskikh voysk protiv Vengerskikh myatezhnikov v 1849 godu (Description of the Russian Forces' Action against the Hungarian Rebels in 1849), (Voyennaya tipografiya, St Petersburg, 1851), pp.11-14, reveals that the Austrian First Minister, Prince Schwartzberg and the Commander in Chief of the Austrian army, General Vel'den, requested the move, a request with which the Russians complied as 'kazhdy chas byl dorog' ('Every hour was precious'). 'Materialy otnosyashchiesya k Vengerskoy voyne 1849 goda' ('Materials relating to the Hungarian War of 1849'), Vsb, Vol. 235 6/1897, pp. 315-32 and Vol. 236, 7/1897, pp. 156-82 also reveals (pp. 325-6 of the first part) that the Emperor was against sending 'small detachments' such as the corps of 25,000 which the Austrians were preparing to receive, but that General Prince Paskevich did not await Imperial consent before sending a 'composite division' (svodnaya diviziya) of 13,000 infantry and 48 guns under command of Lt Gen Panyutin. This force left Cracow by rail on 27 April (9 May N.S.), 1849. This first use of the railway to transport troops thus appears to have owed nothing to pre-war Russian theory, and everything to hasty improvisation, with some misgivings, in an emergency at a foreign army's suggestion. Foreign discussion of railways as operational/ strategic lines had been translated into Russian in 1846 (see note 22), and was reviewed in the 1850s: see 'Zheleznnye dorogi, kak voyennyya operatsionnyia linii' ('Railroads as military operational lines'), Voyenny zhurnal, No. 1, 1854, pp. 137-42 (Review of the German of 'Pz.' (also author of 1846 article)).

24. The submarine, Diable Marin, apparently arrived at Kronstadt in thick fog, its sinister appearance terrifying a sentry. Fuller, Machine Warfare, p. 33.

25. Lt Colonel A Kochetkov, 'Russkiy voyenny teoretik M I Bogdanovich' ('The Russian Military theorist M I Bogdanovich', Voyenno-istoricheskiy zhurnal (Military Historical journal, hereafter VIZh), 8/1968, pp.77-84. In his earlier works, during the 1840s, Bogdanovich stressed the role of moral factors but later he came to recognize the dependence of strategy and tactics on material factors also. At the time of the outbreak of the Crimean War he wrote two articles, 'O noveyshikh usovershenstvovaniyakh ruchnogo ognestrel'nogo oruzhiya' ('On the latest improvements in Small Arms') and 'O vliyani na taktiku tekhnicheskoy chasti voyennogo dela' ('On the Influence of Military materiel on Tactics') in which he stressed that technology would influence tactics. See especially the latter in Voyenny zhurnal (Military Journal), 6/1854, pp. 69-94.

26. Meshcheryakov, p. 195, citing Dnevnik D A Milyutina (The Diary of D A Milyutin) (4 Vols., ed. P A Zayonchkovskiy, Lenin State Library, Moscow, 1947-50), Vol. 2, p. 218.

27. For detailed analysis of the reasons for failure at Plevna, General H Langlois, Lessons from Two Recent Wars [The Russo-Turkish and South African Wars]. Translated for the General Staff, War Office, from the French...(Her Majesty's Stationery Office (HMSO), London, 1909).

28. Voprosy strategii i operativnogo iskusstva v sovetskikh voyennykh trudakh (1917-1940 gg.) (Questions of Strategy and Operational Art in Soviet Military writings, 1917-1940), (Voyenizdat, Moscow, 1965), including: M V Frunze, (1885-1925), Front i tyl v voyne budushchego (1925), pp. 62-69; I I Vatsetis (1873-1938), O voyennoy doktrine budushchego (1923), pp. 178-189; V K Triandafillov, (1894-1931), Kharakter operatsiy sovremennykh armiy (2nd ed., 1932), pp. 291-345; S M Belitskiy (1889-1937), Strategicheskiye rezervy v sovremennoy voyne, (1930), pp. 346-361; S N Krasil'nikov (1893-) Organizatsiya krupnykh obshchevoyskovykh soyedineniy budushchego, (1933) pp. 470-487; K B Kalinovskiy (1897-1931), Chto mozhet dat' mekhanizatsiya i motorizatsiya v budushchey voyne, (1930), pp. 555-8, immediately followed by Problema motorizatsiya i mekhanizatsiya sovremennykh armii, (The Problem of Motorizing and Mechanizing Contemporary Armies) (1931), pp. 558-68; V V Favitskiy (1896-1938), Rol' mekhvoysk [mekhanizirovannykh voysk] v sovremennoy operatsii, (1933) pp. 601-11; I P Sukhov, (1895-1962), Tanki v sovremennoy voyne, (1940) pp. 612-20. The introduction to this important book makes frequent reference to budushchaya voyna - future war (fare) and to future wars. See in particular pp. 16-17. The book also includes a short survey of important writers on questions of strategy and operational art and their works not included in the collection (pp. 736-52).

29. Col. D Palevich, 'Kharakter i osobennosti sovremennoy voyny', KVS, 21/1962, pp. 76-82.

30. Maj Gen K Bochkarev, 'O kharaktere i tipakh voyn sovremennoy epokhi', KVS, 11/1965, pp. 8-17.
31. Col. Yu Vlassevich, 'Sovremennaya voyna i ekonomika', KVS, 12/1967, pp. 27-30. Vlassevich begins by noting the complexity of foreseeing (predvidet') the characteristics of a war 'in contemporary conditions', and in the next sentence mentions the character of an 'impending war' (predstoyashchaya voyna).
32. Lt Col V Kozlov, 'Kharakter i osobennosti sovremennoy voyny', KVS, 19/1969, pp. 72-78.
33. Captain M Ruban, 'Moral'ny faktor v sovremennoy voyne', KVS, 24/1972, pp. 25-32.
34. Col. V Izmaylov, 'Kharakter i osobennosti sovremennykh voyn', KVS, 6/1975, pp. 67-75.
35. I Kovalev, 'Aviatsionnaya razvedka' ('Air reconnaissance'), Voyennaya Mysl' (Military Thought, VM), 9/1938, pp. 57-81, 'O kharaktere budushchey voyny' (p. 57), 'v sovremennoy voyne' and 'v budushchey voyne' (p. 63), 'nasyshcheniye sovremennykh armii' (p. 64), 'budushchego protivnika' and 'budushchaya voyna' (pp. 80, 81).
36. A Gurov, 'Economika i voyna' ('Economics and War'), VM 7/1965, pp. 3-26, refs. on pp. 4, 5, 6, respectively.
37. Col. Gen. G P Pastukhovskiy, 'Razvërtivaniye operativnogo tyla v nachal'ny period voyny' ('The deployment of the operational rear[services] in the Opening Period of the War'), VIZh 6/1988, pp. 18-27, ref. to views of the time on 'future war', p. 19; 'ni vozmozhnosti dlya yeyë perestroyki i perepodgotovki v nachal'ny period sovremennoy voyny ne budet' (p. 27).
38. 'A Neznamov, Sovremennaya voyna: deystviya polevoy armii (Modern Warfare: the Action of the Field Army) (1912), rein Beskrovny, ed. Russkaya voyenno-teoreticheskaya mysl'...pp. 551-667, this p.555.
39. Interview with Dr Romil K Tschenin of the Institute of World economics and International Relations, Soviet Academy of Sciences, an authority on war economy, on a visit to Edinburgh, January, 1989.
40. Interview with Viktor Suvorov (former GRU officer), at offices of his publishers, Hamish Hamilton, Kensington, London, 18 May 1990.
41. Confidential record, p. 2.

42. John Hines interview with Maj Gen Larionov, December, 1989. Larionov stopped Hines before he had even finished asking the question about the continued use of the term 'budushchaya voyna'. It was 'a silly preoccupation', said the Soviet authority: he used the term, and his colleagues used the term.
43. Kokoshin and Lobov, Predvideniye, Znamya, February 1990, central section pp. 173-77: 'A A Svechin gave concrete military-political prognoses of the character of future war'(as seen from then)(p. 173).
44. Ruban, 'Moral'ny faktor v sovremennoy voyne', p. 29.
45. Izmaylov, 'Kharakter i osobennosti...' pp. 67, 72.
46. M N Tukhachevskiy, Voprosy sovremennoy strategii, in Voprosy strategii i operativnogo iskustva..., pp. 90-101 (originally published by Voyenny vestnik in 1926), esp. pp. 93-5.
47. M N Tukhachevskiy O kharaktere sovremennykh voyn v svete resheniy VI Kongressa Komintern(On the Character of Contemporary War in the Light of the Decisions of the VI Comintern Congress) in Kommunisticheskaya Akademiya, sektsiya po izucheniyu problem voyny (Section for the Study of Problems of War), Zapiski (Notes), Vol. 1, (Izd. kommunisticheskoy akademii, Moscow, 1930), pp. 6-29. Reference to paper Kharakter budushchikh voyn v svete resheniy VI Kongressa Komintern (The Character of Future Wars...) in Khronika-publichnye doklady (published papers), p. 213.
48. 'Voyna zavtrashnego dnya(Iz doklada prof A Verkhovskogo v Voennoy Akademii)' ('War of Tomorrow (from a Paper given by Prof. A Verkhovskiy in the Military Academy)'), Krasnaya zvezda (Red Star - KZ), 18 October 1925 p. 2 col. 2.
49. The problem of fairly scarce armoured formations racing ahead of more numerous forces still reliant on foot and horse mobility remained throughout World War II. See Captain Jonathan A M House, Towards Combined Arms Warfare: a Survey of Tactics, Doctrine and Organization in the 20th Century, (Combat Studies Institute, US Army Command and General Staff College, Fort Leavenworth, 1984).
50. Palevich, 'Kharakter i osobennosti...', Bochkarev 'O Kharaktere i tipakh...', Vlasevich 'Sovremennaya voyna...', Kozlov, 'Kharakter i osobennosti...', Ruban 'Moral'ny faktor...', Ismaylov 'Kharakter i osobennosti...'. See also Ye Rybkin 'O sushchnosti mirovoy raketno-yadernoy voyny' ('On the Essence of a World Nuclear Rocket War', KVS 17/1965 pp. 50-56 and Colonel S

Malyanchikov, 'Sovremennaya voyna i moral'no- boyevye kachestva voynov', ('Contemporary War and the moral-political training of soldiers'), KVS, 3/1967, pp. 48-53.

51. Confidential record, p. 2. See also part 4.

52. Captain R Frolov, 'Vvod tankovogo sovedineniya v proryv' ('Inserting a tank formation into a breakthrough'), KZ 20 October, 1940, p. 2, 'Opyt sovremennykh voyn pokazyvayet...', presumably referring to recent German successes in France.

53. For example, Maj Gen V Matsulenko, 'Lokal'nye voyny imperializma (1946-1968 gg.)' ('Local Wars of Imperialism, 1946-68'), VIZh 9/1968 pp. 36-51. Lt Col G Malinovskiy, 'Lokal'nye voyny v zone natsional'no-osvoboditel'nogo dvizheniya' ('Local Wars in the Zone of National Liberation Movements'), VIZh 7/1974, pp. 91-8; I Shavrov, 'Lokal'nye voyny i ikh mesto v global'noy strategii imperializma' ('Local Wars and their Place in the Global Strategy of Imperialism'), VIZh, 3/1975, pp. 24-38 and 4/1975, pp. 90-97; Lt Gen of Engineers A Paliy, 'Radioelektronnaya bor'ba v izrail'sko-arabskikh voynakh' (Radioelectronic Combat [Electronic Warfare - REB] in the Israeli-Arab Wars'), VIZh 7/1980, pp. 65-71; Major General V Larionov, 'Nekotorye voprosy voyennogo iskusstva po opytu lokal'nykh voyn' ('Certain Questions of Military Art According to the Experience of Local Wars'), VIZh 4/1984; I Shavrov, 'Lokal'nye voyny: Istoriya i sovremennost' (Local Wars: History and the Present), (Voyenizdat, Moscow, 1981). A section featuring articles on local wars advertised by a graphic showing a limited area of the earth's surface bursting into flames has been a regular feature in VIZh: recent ones include Col S V Seroshtan 'Radioelektronnaya bor'ba v lokal'nykh voynakh na Blizhnem Vostoke' ('REB in Local Wars in the Near East'), VIZh 3/1986 pp. 62-67; Lt Gen of Aviation V SA Sokolov 'Razvitiye taktiki istrebiteley-bombardirovshchikov v lokal'nykh voynakh' ('Development of Tactics of Fighter Bomber Aviation in Local Wars'), VIZh 4/1986 pp. 65-72; Col R M Portugal'skiy, 'Narusheniye upravleniya voyskami protivnika' ('Destroying Enemy Command and Control'), VIZh 1/1988, pp. 74-79, Lt Col V A Yermakov, 'Nekotorye voprosy razvitiye sistem voyennoy svyazi sukhoputnykh voysk SShA' ('Questions of Development of Military Signals Systems of the US Ground Forces'), VIZh 6/1988, pp. 69-73.

54. 'Nablyudatel'' ('An observer') 'Novoye v voyennom iskusstve na zapade' ('What's new in Military Art in the West'), KZ, 4 December 1940, pp. 3, 4. The author gives MV Frunze's prognoz about 'future war', and then says that the 'Second Imperialist War' has borne this out; Battalion Commissar V Zakharov, 'Opyt grazhdanskoy voyny v SSSR i

sovremennost' ('The Experience of the Civil War in the USSR and Modern Times'), KZ 8 February 1941, p. 3, Cols. 2 and 3 of article 'vtoraya (mirovaya) imperialisticheskaya voyna'.

55. 'Znachenie nyneshney voyny dlya moguchestva Anglii' ('The Significance of the present war for British Power'), Voyenny zhurnal, No 3, 1855, p. 170; S M-skiy, 'Uroki voyny', Russkiye vedomosti, 1 January 1915, '...certain features, characteristic of the present (nyneshney)war'..

56. Morskoy, Voyennaya moshch' Rossii(1915), Ch. 6, p. 131.

57. MSb 9/1914, pp. 297-8 'Vestnik Evropy o vozmozhnosti voyny v blizkom budushchem' (retrospectively, to an article published before the war).

58. Pravda 19 January 1977, p. 2, col. 2.

59. Verkhovskiy in KZ 18 October 1925 p. 2 col. 1 ('kakova zhe budet voyna?'...'Pravil'noye ponimaniye budushchey voyny imeet gromadnoye znacheniya' ('What will war be like'... 'A correct understanding of future war has enormous significance'); col.2, col. 4.

60. N P Mikhnevich, Osnovy Strategii (Principles of Strategy)(St Petersburg, 1913), Extract in L G Beskrovny, ed., Russkaya voyenno-teoreticheskaya mysl' xix i nachala xx vek (Russian Military-Theoretical Thought of the 19th and early 20th Centuries), (Nauka, Moscow, 1960), pp. 452-550, this in the section 'Establishment of the Principal Idea of a War Plan', pp. 463-64.' The term continued in use throughout this century: see Vlasovich, 'Sovremennaya voyna i ekonomika', KVS, 12/1967, p. 27.

61. Nikonov and G Tummeltau, 'Budushchaya voyna', SVE, Vol. 2 (1933), pp. 834-44.

62. Vazhneyshuyu chast' voyennoy doktriny. The most important would have been samuyu vazhneyshuyu. Confirmation of this appears in, for example, Major General S Krasil'nikov 's review of Melikov's book of the same title 'Strategicheskoye Razvertivaniye' ('Strategic Deployment'), KZ 24 September 1940, p. 3 'The author enumerates [some]most important (vazhneyshiye) aspects of strategic deployment, but not all'.

63. SVE Vol. 2 (1976), pp. 183-88. The definition of Military Science has changed little since the appearance of General G A Leyer's Entsiklopediya voyennykh i morskikh nauk (Encyclopedia of Military and Naval Sciences), (8 Vols., St Petersburg, 1883-97), Vol. 2, p. 228, which

describes the aim of Military Science as 'the elucidation of the nature(essence and qualities) of military affairs', leading to 'the teaching of leading principles for activity in the future'. On the modern definition see also Slovar'osnovnykh voyennykh terminov.

64. SVE, Vol. 2, (1976), p.184; Kir'yan, Problemy voyennoy teorii... p. 59, on 'The component parts of military science'.

65. SVE Vol. 2 (1976), pp. 211-18. On the levels of military art, see also part 3.

66. Bol'shaya sovetskaya entsiklopediya (Great Soviet Encyclopedia - BSE), Vol. 12 (Sovetskaya entsiklopediya, Moscow, 1928), cols. 326-27, 'voyennye nauki'. This volume contains several useful related articles. A Svechin wrote the entry on Military Art (Voyennoye iskusstvo, cols. 218-229, which indicates that it was seen as something different from Military science (col. 218). See also A Burov's entry on War and technology/technique ('Voyna i tekhnika') (cols. 610-44, R Tsiffer's on Military Doctrine (cols. 163-65), Tikhomirov's on Military Academies (cols. 318-22) and Tukhachevskiy's well known article 'War as a Problem of Armed Struggle' ('Voyna kak problema vooruzhennoy bor"by') (cols. 578-98). By 1948 Military Art had found its position as a definite subset of Military Science: Marshal A Bulganin, Tridsat' let sovetskikh vooruzhennykh sil (Thirty years of the Soviet Armed Forces) (Voenizdat, Moscow, 1948), p. 12.

67. SVE, Vol. 3, (1977), pp. 225-29; VES (1986), p. 240.

68. Neznamov, cited in S Kozlov, M Smirnov, I Baz, P Sidorov, O sovetskoy voyennoy nauke, (Voenizdat, Moscow, 1964), p. 380.

69. A A Prokhorov, 'O sushchnosti i sodержanii sovetskoy voyennoy doktriny' ('On the essence and composition of Soviet military Doctrine', VIZh 10/1963, pp. 121-22, following L Belousov, 'Konferentsiya o sovetskoy voyennoy doktriny' ('Conference on Soviet Military Doctrine'), ibid. The conference was held on 25 May 1963.

70. BSE, Vol. 12, (1928), cols. 163-65, article by R Tsiffer, taking his definition directly from Frunze.

71. Ibid.

72. General A N Kuropatkin, Zadachi russkoy armii (The Role of the Russian Army) (3 Vols., St Petersburg, 1910), Vol. 3, pp. 356, 371. Kuropatkin considered Russia's 'cultural poverty' in comparison with her western neighbours to be a source of danger and demanded measures

to develop the moral and cultural tone of the nation as a whole. Soviet scholars have stressed the importance of military science as a reflection of general culture, for example M M Kir'yan, Istoriya otechestvennoy voyenno-entsiklopedicheskoy literatury (History of National Military Encyclopaedic Literature), (Nauka, Moscow, 1980).

73. N V Ogarkov, Vsegda v gotovnosti k zashchite otechestva (Always in Readiness to defend the Homeland), (Voyenizdat, Moscow, 1982)(signed to press 26 January), pp. 53-4.

74. 'Soviet Military Doctrine' lecture on 18 October 1988 attended by the author and reported in The Journal of the Royal United Services Institution (RUSI), Winter 1988, pp. 5-10.

75. SVE Vol. 3, (1977), p. 225, defines Doctrine as 'prinyataya v gosudarstve na dannoye vremya sistema vzglyadov na tseli i kharakter vozmozhnoy voyny' ('the system of views on the aims and character of a possible war accepted at a given time'). Five years later. Ogarkov, in Vsegda v gotovnosti..., p. 53 is more precise, stressing that it is 'the system of views on the essence, aims and character of a possible future war (vozmozhnoy budushchey voyny) adopted in a given country for a given (specific) time (na dannoye (opredelennoye) vremya)', thus preparing his audience for the idea that Military Doctrine must change, a form of words repeated verbatim in the entry on Doctrine in the 1983 and 1986 VES, (p. 240 of the latter).

76. Inverted commas, Capt Bronisław Jędryka, 'Przyszła wojna' w przewidywaniach Gen Władysława Sikorskiego' ('Future War' in the Predictions of General W Sikorskiy'), WPH 4/1978, pp. 290-302. Skibiński, 'Z historii doktryn wojennych', WPH 4/1970, p. 252. 'Command Doctrine' is the author's translation of doktryna plemarchiczna, from the Greek plemarchos, 'supreme commander'; see Mała Encyklopedia Wojskowa (Little Military Encyclopedia), (3 Vols., Wydawnictwo Ministerstwa Obrony Narodowej, Warsaw, 1967), Vol. 2, p. 660.

77. SVE, Vol. 3 (1977), pp. 225-29. Military Doctrine of socialist and non-socialist countries is considered to have certain common characteristics, arising from the scientific and technical 'state of the art' and the experience of past wars, which are the two principal components of the military technical character of future war. Also M M Kir'yan, Voyenno-tekhnicheskiy progress i vooruzhennyye sily SSSR (Military-technical and technological progress and the Armed Forces of the USSR), (Voyenizdat, Moscow, 1982, pp. 311-16, for

discussion of 'future war' as part of Military Doctrine. See also Savushkin, 'Zarozhdeniye...'

78. VES, (1986), p. 240.

79. Gareyev, Soviet Military Doctrine, 18 October 1988, 'core', recorded RUSI, p. 7, 'won't give up', in response to questions.

80. Neely and Kime, 'Perestroika, Doctrinal Change and the Soviet Navy'(1988), pp. 47, 54.

81. See for example Lt Gen Arty A V Koritchuk, 'Bor'ba s protivotankovymi sredstvami v nastuplenii'('Fighting Anti-Tank Weapons in the Offensive'), Voyenny vestnik (Military Herald - VV) 6/1975, pp. 67-70, one of many articles which appeared in the wake of the 1973 Arab-Israeli War, and the articles in note 5.3 Portugal'skiy 'Narusheniye upravleniye...' examines lessons of Vietnam, 1973, the Israeli attack on Lebanon in 1982 and the Falklands War of the same year. Paliy, 'Radioelektronnaya bor"ba...' makes the specific connexion between experience in the Middle East and the use of weapons and 'radioelectronic technology destined for European theatres of military operations'(p. 71).

82. Palevich, 'Kharakter i osobennosti...', KVS 21/1962, p. 78; Col I Korotkov, 'O razvitii sovetskoy voyennoy teorii v poslevoyennye gody'('On the Development of Soviet Military theory in the Post-War Years'), VIZh 4/1964 pp. 38-51, this p. 47.

83. Savushkin, 'Zarozhdeniye...', p. 20, 'voyenny (tekhnicheskiy) kharakter'; VES (1986), p. 792, 'voyenno-strategicheskii (tekhnicheskiy) kharakter'.

84. Skibiński, 'Z historii...', WPH 4/1970, p. 251.

85. VES (1986), p. 792. Entry on 'Kharakter voyny'.

86. A concise description of this process is in Jacob W Kipp 'Conventional Force Modernization and the Asymmetries of Military Doctrine'..., in Carl G Jacobsen, ed., The Uncertain Course, New Weapons Strategies and Mind Sets (Stockholm International Peace Research Institute/Oxford University Press, 1987), pp. 137-66; David R Jones, 'Soviet Military Doctrine and Space', pp. 93-135 also contains a good analysis of recent statements on Doctrine.

87. Col Gen F F Gavvronskiy, 'Prevoskhodstvo sovetskoy voyennoy nauki i voyennogo iskusstva v Velikoy Otechestvennoy voyne'('The Superiority of Soviet Military

Science and Military Art in the Great Patriotic War'), VIZh 4/1986, pp. 13-21, this p. 14.

88. Ibid., p. 14.

89. Kir'yan, Problemy..., p. 83.

90. Ibid., p. 87.

91. SVE, Vol. 7(1979), p. 556.

92. Marshal of the Soviet Union V D Sokolovskiy, Voyennaya Strategiya (Military Strategy), (3rd Edition, Voenizdat, Moscow, 1968), p. 18. This passage has remained unchanged throughout the three editions (1962, 1963, 1968). Sokolovskiy continues 'Military Strategy's principal attention is devoted to studying the conditions under which a future war may arise...In examining the probable enemy's strategic views, Military Strategy turns its attention to the sort of political and military aims the enemy might pursue in future war.' The previous major Soviet work entitled Strategy, (a title which is not bestowed on a book lightly in the Soviet Union but implies a high degree of authority), Svechin's Strategiya (2nd Edition, Voenny vestnik, Moscow, 1927), is also riddled with references to future war. See in particular 'Strategiya v ryadu voyennykh distsiplin' ('Strategy in the spectrum of Military Disciplines'), p. 13, references to future war on pp. 36, 42, etc. On Svechin's work and career, see part 3.

93. On recent criticisms of Sokolovskiy see M A Gareyev, M V Frunze, Voenny teoretik (M V Frunze, Military theorist), (Voenizdat, Moscow, 1985), esp. pp. 239-46.

94. Kir'yan, Problemy... p. 93.

95. Colonel V I Ulyanov, 'razvitiye teorii glubokogo nastupatel'nogo boya v predvoyennye gody' ('Development of the Theory of Deep Offensive Operations in the pre-War Years'), VIZh 3/1988, pp. 26-33, this ref., p. 26.

96. UK War Office (WO) 32/13087, Report of the Committee on the Lessons of the Great War (A 3629), October, 1932, p. 29.

97. Kuropatkin, The Russian Army and the Japanese War, Vol. 2, pp. 11-12.

98. Clausewitz, On War, ed. Howard and Paret, Bk.1, ch.1, section 21, p. 86, likening war to a game of cards; Jomini, Précis de l'Art de la Guerre, (Second edition, 1855), 1-ère partie, 'Sur la theorie actuelle de la Guerre', p. 26, 'La guerre est un grand drame, dans lequel

mille causes morales ou physiques égisent plus ou moins fortement, et qu'on ne saurait rendre à des calculs mathématiques'.

99. Lt Gen M M Kir'yan, 'Nachal'ny period Velikoy Otechestvennoy voyny' ('The Opening Period of the Great Patriotic War'), VIZh 6/1988, pp. 11-17, this pp. 11-12; VES (1986), p. 481. See also Ya Ya Alksnis 'Nachal'ny period voyny' ('The Opening period of War'), ViR 9/1929, pp. 3-22; R Eydeyan, 'K voprosu o kharaktere nachal'nogo perioda voyny' ('On the Question of the Character of the Opening Period of War'), ViR, 3/1931, pp. 11-17; V Novitskiy, 'Voyennomorskiye sily v nachal'ny period voyny' ('Naval Forces in the Opening Period of War'), ViR June-July, 1935, pp. 46-55. On views of the initial period of a future war in the 1930s and the role of the Soviet general Staff, see also Marshal M Zakharov, 'O teorii glubokoy operatsii' ('On the Theory of the Deep Operation'), VIZh, 10/1970, pp. 10-20, esp. p. 18

100. Kir'yan, 'Nachal'ny period Velikoy Otechestvennoy voyny', p. 11.

101. Mikhnevich, Osnovy Strategii in Beskrovny, ed., Russkaya voyenno-teoreticheskaya mysl'... p.462, 'Raznitsa mezhdru planom voyny i planom kampanii' ('The Difference between a War Plan and a Plan of Campaign'). This idea had a long pedigree in Russian Military thought: see also General G A Leyer, 'Znachenie kriticheskoy voyennoy istorii v izuchenii strategii i taktiki' ('The Significance of Critical Military History in the Study of Strategy and Tactics'), VSb 5/1863, Part 1, pp. 57-93, which begins (p. 57) by stressing 'the impossibility of predicting everything in advance in war'. On Mikhnevich, see also Col A Ageyev, 'Voyenno-teoreticheskiye vzglyady N P Mikhnevicha' ('The Military-Theoretical Views of N P Mikhnevich'), VIZh, 1/1975, pp. 90-95, and especially the note on p. 95 on Mikhnevich's Strategy and the character of future war.

102. Mikhnevich, Osnovy Strategii...in Beskrovny, pp. 463-4.

103. Ibid., p. 462.

104. Vremenny polevoy ustav - 1936 (PU-36), (Temporary Field Service Regulations, 1936), (Gosudarstvennoye voyennoye izdatel'stvo, Narkomata oborony SSSR, Moscow, 1937), p. 16, para. 8, 'and during combat itself it is necessary to study the effect of new weapons, seeking the most effective method of employing them to attain victory'.

105. Committee for the Study of War Experiences, Red Army General Staff, Sbornik materialov po izucheniyu opyty voyny, (Collection of Materials for the Study of War Experience), (Voenizdat, Moscow, 1943 onwards). There are over sixty volumes in this series, which was initiated by a Stavka order of November, 1942. Six of these volumes are available in US national archives; the rest are available only in Poland and/or the USSR, although efforts to obtain them are underway at the time of writing.

106. N Klado, 'O tselyakh i kharaktera zhurnala "Morskoy Sbornik"', MSb 9-12/1919, pp. 1-5, this p. 2, emphasis in Klado's original. See also 'O novykh zadachakh "Morskogo Sbornika"' ('On Morskoy Sbornik's new Tasks'), MSb 1-2/1922, p. 1.

107. 'Boyevoy opyt mirovoy i grazhdanskoy voyny 1914-22 gg. na more', MSb 1-2/1922, pp. 101-12, with a list of all the works by the Committee for analysing the 1914-20 war at sea, 57 in number.

108. Clausewitz, On War, Paret and Howard Translation, Bk. 3, ch. 8, p. 195.

109. N V Korobkov, ed., Semiletnyaya voyna : materialy o deystvii russkoy armii i flota, 1756-1763 gg. (The Seven Years' War. Documents Relating to the Operations of the Russian Army and Fleet)(Voenizdat, Moscow, 1948), citing 'Relyatsiya P S Saltykova Imperatritsr Yelizavete o podrobnostyakh srazheniya pri Kunersdorfe' ('P S Saltykov's Report to the Empress Elizabeth on Events of the Battle at Kunersdorf')(9(21)August, 1759), p. 488 and plan number 5.

110. Jomini, Précis de l'Art de la Guerre, translated as The Art of War by Mendell and Craighill, ch. 2, article 13, pp. 48-49 and Appendix II, p. 355.

111. Kir'yan, Problemy..., p. 93.

112. See C D Bellamy, 'The Russian Artillery and the Origins of Indirect Fire', Army Quarterly and Defence Journal, Vol. 112, April and July, 1982, pp. 211-20 and 330-37, respectively.

113. I V Stalin, Address to Graduates from the Red Army Academy (4 May 1935), in J Stalin. 3 Speeches, (Martin Lawrence, London, 1935), pp. 4-11, this p. 8. ✓

114. 'Obobshcheniye opyta voyny' is sufficiently defined as a concept to rate an entry in VES(1986), p. 496. It is encountered frequently, for example in Ogarkov, 'Voyennaya nauka i zashchita...'(1978), pp. 115-16.

115. Nikonov and Tummeltau, SVE(1933), Vol. 2, p. 842
116. See for example Col A Baranov 'V I Lenin o Sootnoshenii cheloveka i tekhniki v voyne' ('V I Lenin on the relationship of Man and Technology in War'), KVS 5/1970, pp. 18-24; Col M Yasyukov, 'Nauchno-tekhnicheskaya revolyutsiya i razvitiye lichnosti sovetskogo voina' ('The Scientific-Technological Revolution and the Development of the Soviet Soldier's Character'), KVS 13/1970, pp. 9-16; Lt Col L Ivanov and Col AKhorkov, 'Chelovek i tekhnika v voyne' ('Man and Technology in War'), VIZh 10/1978, pp. 86-90; Maj Gen A Milovidov, 'Dialekticheskaya vzaimosvyaz' cheloveka i voyennoy tekhniki' ('The Dialectical Interrelationship between Man and Military Equipment'), VIZh 2/1979, pp. 10-16; Col V Bondarenko, 'Nauchno-tekhnicheskii progress i voyennoye delo' ('Scientific-Technical progress and Military Affairs'), KVS 21/1986, pp. 9-16; Col N Goryachev, 'Znat' i umelo primenyat' vverennoye oruzhiye i boyevuyu tekhniku' ('To Know the Weapons and Military Equipment Entrusted to You and to Use it Well'), KVS 2/1987, pp. 73-79.
117. On War, ed. Howard and Paret, Bk. 1, ch. 1, p. 86.
118. Jomini, Précis, (1855 ed.); see note 97.
119. Ilmari Susiluoto, The Origins and Development of Systems Thinking in the Soviet Union. Political and Philosophical controversies from Bogdanov and Bukharin to Present-Day Re-Evaluations, (Suomalainen Tiedakatemia, Helsinki, 1982), p. 27.
120. Ibid., p. 20.
121. Ibid., p. 46.
122. Bogdanov, Tektologia...(1922 edn.) Preface to 1917 edn., p. 6.
123. Ibid., p. 7.
124. Ibid., p. 8.
125. Ibid., preface to 1922 edn. (dated 19 November 1921), pp. 19-20 (istoricheskaya neobkhodimost' i nauchnaya vozmozhnost tekhnologii).
126. Ibid., p. 20.
127. Kurs politicheskoy ekonomii (Moscow Soviet of Workers' and Soldiers' Deputies, Publication and Bookselling Department, Moscow, 1918-20). Vol. 1 was published in 1918, 2.1 in 1920, 2.2 and 2.4 in 1919), this cited in Susiluoto, pp. 60-61. Susiluoto interprets

vozdushnye miny as something akin to a 'guided missile': in fact, it was the standard Imperial Russian and First World War term for an aerial bomb.

128. Ibid., pp. 59-60.

129. Zherve, 'Morskiye ocherki', MSb 1-2/1922, p. 17, 'bezsystemnost' i kaleydoskopichnost'...'

130. Thomas S Kuhn, The Structure of Scientific Revolutions, (2nd edn., enlarged, Foundations of the History of science, Vol. II, No. 2, International Encyclopedia of Unified Science, University of Chicago Press, 1970)(First edition was 1962). See also Barry Barnes, T S Kuhn and Social Science, (Macmillan, London, 1982).

131. See note 2.

132. Correlli Barnett 'The War that never was', Futures, August 1975, reproduced in Ralph Jones, Readings from Futures, 1974-80, (Westbury, Guildford, 1981), pp. 232-37, this on p. 232.

133. Kuropatkin, The Russian Army in the Japanese War, Vol. 2, pp. 22-23.

134. 'Revolyutsiya v voyennom dele', SVE, Vol. 7, 1979, p. 82, entry by Kir'yan; VES(1986), p. 628. The later entry describes the Revolution as beginning after World war Two in connexion with nuclear weapons, electronic technology, automated command and control systems, suggesting that from a 1980s perspective the 'Revolution in Military Affairs' was not just concerned with nuclear warheads and ballistic missiles, but was continuing in the 'post nuclear' era. Traditional relationship of attack and defence questioned in Col A Yekimovskiy, Capt N V'yunenkov, Col P Shkarubskiy, 'O sushchnosti i klassifikatsii nekotorykh yavleniy vooruzhennoy bor'by' ('On the Essence and Classification of Certain Phenomena of Armed Struggle'), Voyennaya Mysl', 7/1965, pp. 14-26.

135. See C D Bellamy 'The Russian Artillery and the Origins of Indirect Fire'... for a full discussion of this change.

136. Kuhn, The Structure of Scientific Revolutions, p. 99.

137. See Salewski, Zeitgeist und Zeitmaschine...pp. 170-71.

138. General Baron Dr Hugo von Freytag-Loringhoven, 'Wandlungen im operativen und taktischen Verfahren Napoleons verglichen mit denjenigen des Weltkriegs' ('Changes in Napoleon's Operational and Tactical Methods compared with those of the [First World] War'), Wissen und Wehr (Military Thought), (Berlin, 1921), pp. 336-38.

139. G S Isserson 'Operativnyye perspektivy budushchego' ('Operational perspectives of the Future'), VM 8/1938, pp. 14-26, quotation on p. 23. See also 'Vstrechnoye srazheniye budushchego' ('The [Operational] Meeting Engagement of the Future'), VM 7/1938, pp. 10-26 and 'Razvitye teorii operativnogo iskusstva v 30-e gody' ('Development of the theory of Operational art in the 1930s'), 2 parts, VIZh 1/1965 pp. 36-46 and 3/1965, pp. 48-61.

140. Prognoz: see part 1, note 17; also Kir'yan, Problemy... pp. 92-101, 'O nauchnom predvidenii i prognozirovanii v voyennoy oblasti' ('On Scientific Foresight [Prediction] and Prognostication in the Military sphere').

141. Goushev and Vassiliev, pp. 10-11.

142. John Erickson, 'The Soviet Union, the Future and Futures Research', Futures, August, 1977, pp. 335-9, esp. pp. 337-38.

143. Ibid., p. 337.

144. Col Ya M Gorelik, 'Predvideniya M N Tukhachevskogo' ('M N Tukhachevskiy's Predictions'), VIZh 9/1988, pp. 18-22. Predvideniya is either genitive or plural, rather than the nominative singular 'foresight'.

145. Kokoshin and Lobov, 'Predvideniye...', Znamya, February 1990, pp. 170-82.

146. See Col V Konoplëv, 'Praktika i nauchnoye predvideniye v voyennom dele' ('Actual Practice and Scientific Foresight in Military Affairs'), KVS 14/1966, pp. 52-57.

147. Ibid., pp. 56-57.

148. Maj Gen V K Konoplëv, Nauchnoye predvideniye v voyennom dele (Scientific Foresight in Military Affairs), (Voyenizdat, Moscow, 1974), signed to press 6 February 1974 after an editorial/ censorship period lasting 16 months, an unusually long time.

149. See Erickson, 'The Soviet Union, the Future and Futures Research', p. 337.

150. In his 1966 article 'Praktika i nauchnoye predvideniye...' Konoplëv refers to 'nauchnoye predskazaniye' (p. 53). In Nauchnoye predvideniye v voyennom dele (1974) he defines Scientific foresight as 'a prophecy' (Predskazaniye) of the appearance or future discovery of events, processes, phenomena based on a knowledge of objective laws and dialectical-materialistic analysis of reality' (p. 21).

151. Yu V Chuyev, Yu B Mikhaylov, Prognozirovaniye v voyennom dele, (Voyenizdat, Moscow, 1975), translated as Forecasting in Military affairs by DGIS, Secretary of State, Ottawa and published under the auspices of the US Air Force, (US Government printing Office, Washington, 1980), p. 8 of the latter.

152. Ibid.

153. Ibid.

154. Konoplëv, Nauchnoye predvideniye... pp. 54-56.

155. Esli mir razoruzhitsya, (Institute of International Relations, Moscow, 1961), pp. 3-6 on the character of contemporary war. For other work, see under the name I V Bestuzhev, 'Razvitiye predstavleniy. budushchem chelovechestva v domarksovoy obshchestvennoy mysli', ('Development of Representations of Mankind's Future in pre-Marxist Social Thought'), Voprosy istorii, (Questions of History), 11/1966. See also 'Social Prognostics Research in the Soviet Union' in Robert Jungk and Johan Galtung, ed., Mankind 2000, (Universitetsforlaget, Oslo, 1969); and a critique of 'bourgeois' futurology in 'Utopias of Bourgeois Futurology', Novy Mir, 12 August, 1970, part translated by Ralph Hamil in The Futurist, December 1970, pp. 216-17. Recent articles by Bestuzhev-Lada include 'Forecasting and Planning in the USSR- Part I: 1976-80', Futures, February 1986, pp. 68-77 'Futures Research in the USSR - Part II: 1981-85', Futures, October, 1986, pp. 628-35; 'High Technology and Long-Term Global Problems', Futures, June 1987, pp. 276-81.

156. Bestuzhev-Lada, Esli mir..., p. 75.

157. I V Bestuzhev-Lada, Okno v budushcheye. Sovremennye problemy sotsial'nogo prognozirovaniya, (Window on the Future. Contemporary Problems of Social Forecasting), ('Mysl', Moscow, 1970). See in particular 'prognoz-plan-programma' (p. 15).

158. Ibid., p. p. 56.

159. Ibid., from p. 206.
160. Ibid.
161. See Vladimir and Victorina Lefebvre, Reflexive Control, Vol. III, SAIC 86/6113&FSRC-E, (Science Applications International Corporation, Greenwood, Colorado, February, 1986), pp. 229-30.
162. Bestuzhev-Lada, Okno v budushcheye, pp. 221-30, contact with other civilizations on the latter.
163. Chuyev and Mikhaylov, Forecasting... p. 6.
164. Erickson, 'The Soviet Union, the Future...' p.337; Konoplëv, Nauchnoye predvideniye...p. 57, 'At the present time [1972-4], long-term prognoses and plans are acquiring special significance'.
165. Erickson, 'The Soviet Union...'p. 337. See also Maj Gen M Cherednichenko, 'Voyenno-politicheskoye prognozirovaniye kak vid nauchnogo predvideniya' ('Military-political forecasting as a type of scientific foresight'), KVS, 20/1970, pp. 24-31, and figure 2 in Chuyev and Mikhaylov, Forecasting..., p. 18, which shows the interrelationship between forecasting the political situation, the economy and the development of science and technology and narrower operational tactical and military-technical forecasting.
166. Gen V Kulikov, 'Sovetskaya voyennaya nauka segodnya' ('Soviet Military Science Today'), Kommunist, 7 (May) 1976, pp. 38- 47.
167. Title of Cherednichenko, 'Voyenno-politicheskoye prognozirovaniye kak vid nauchnogo predvideniya'.
168. Rybkin wrote chapter III of A S Milovidov, ed., Voyenno-teoreticheskoye naslediyе V I Lenina i problemy sovremennoy voyny (The Military-theoretical Legacy of V I Lenin and Problems of Contemporary War), (Voyenizdat, Moscow, 1987), pp. 49-75, this section pp. 69-75.
169. Ibid., p. 71.
170. Ibid.
171. Ibid., and Cherednichenko, 'Voyenno-politicheskoye prognozirovaniye...', p. 24.
172. Rybkin in Milovidov, p. 71.
173. A series of articles appeared in Priroda (Nature) in January, 1969, the foreword to which cites a decree of the

Central Committee of the CPSU demanding the development of long term forecasts of 15 or more years into the future (Pravda, 23 October, 1968): 'Chto my думаем о прогнозировании?' ('What do we think about Forecasting?'), including V M Glushkov, 'Modelirovaniye budushchego' ('Modelling the Future'), G M Dobrov, 'Kriterii vybora' ('Criteria of Choice'), V I Siforov, 'Filosofiya dal'nykh prognozov' ('The Philosophy of Long Term Forecasts'), S V Vladimirov (article and diagram) 'Metod Del'fi' ('The Delphi Method'), Priroda, January 1969, pp. 6-13. See also Joseph P Martino 'How the Soviets Forecast Technology', The Futurist, February, 1973, pp. 30-31 and Erickson, 'The Soviet Union...' p. 337. On Soviet forecasting work in the late 1960s and early 1970s see also Joseph P Martino, 'A Deeper Look at how the Soviets Forecast Technology', The Futurist, June 1974, pp. 137-38.

174. Captain-Engineer V Skugarëv, 'Prognozirovaniye i razvitiye voyenno-morskikh flotov' ('Forecasting and the Development of Navies'), Morskoy sbornik (Naval Review), 5/1972, pp. 33-39, this p. 34.

175. Konoplev, Nauchnoye predvideniye... p. 55 (footnote).

176. 50 Years: Benik Buknazar Yuzbashev, ed., The Year 2017: Past, Present and Future, (Novosti, Moscow, 1968) was based on a 1967 prediction looking 50 years ahead. The third article in the Priroda series (note 173) by Vladimir Siforov, argues that it is important to forecast for long periods into the future, even as much as 100 years, because of the 'knock-on' effect of decisions taken now in the or near future.

177. Siforov, 'Filosofiya dal'nykh prognozov', p. 10.

178. Confidential record, p. 2.

179. Siforov, p. 11, 'dal'ekoye busdushcheye', 'dal'nye prognozy'.

180. Skugarëv, 'Prognozirovaniye...', p. 34; Gorshkov, (ed.) Voyenno-Morskoy flot... p. 61.

181. Dobrov, 'Kriterii vybora', pp. 8, 9; ot kol'by do tsisterny.

182. Martino, 'A Deeper Look...', p. 137.

183. Siforov, 'Filosofiya dal'nykh prognozov', p. 11. 'The more distant future, as it were casts a shadow on our time'. He continues 'Predskazyvat' na 100 let vperéd neobychayno trudno'.

184. See for example V I Maksimenko, D Ertel', Prognozirovaniye v nauke i tekhnike (Forecasting in Science and Technology), ('Finance and Statistics' Press, Moscow, 1982)(8,000 copies).

185. Gorshkov, ed., pp 46-47, on system life. On pp. 54-55 the life of a large surface combatant is assessed as up to 30-35 years, missile systems as 15 years and torpedo and gun systems 20-30 years.

186. Ibid., p. 47.

187. Ibid., p. 50.

188. Ibid., pp. 68-69; Makeyev, 'Nekotorye vzglyady...', p. 28.

189. Wacław Stankiewicz, Planowanie obrony (Defence Planning), (Defence Ministry Publishing House, Warsaw(Wyd. MON), 1977), fig. 5 'Powiązanie horyzontów prognoz, programów i planów'.

190. Bestuzhev-Lada, Okno v budushcheye, table 1, pp. 66-67.

191. Martino, 'A Deeper Look...', p.138, col. 2.

192. S V Vladimirov, 'Metod Del'fi', in collection 'Chto my dumayem o prognozirovanii?', Priroda, January 1969, pp.12-13.

193. A A Petrov, 'Matematicheskiye modeli prognozirovaniya narodnogo khozyaystva' ('Mathematical Models for Economic Forecasting'), Znaniye, Mathematics and Cybernetics series) 11/1974, pp. 3, 8, 60-61.

194. Ibid., pp. 60-61.

195. Kir'yan, Problemy... p. 99.

196. VES (1986), pp. 144-45. The seventeen listed are The K E Voroshilov General Staff Academy of the USSR (founded 1936 on the basis of the Frunze Academy); The Malinovskiy Tank Forces' Academy (founded 1932); The A M Vasilevskiy Ground Forces Air Defence Academy (founded 1977 on the basis of the Kalinin Artillery academy), The M V Frunze Military Academy (All-Arms)(founded 1918 as the General Staff Academy, then, from 1921-25, known as the RKKA Military Academy); the Dzerzhinskiy Military Academy (Strategic Rocket Forces and Artillery), founded as the RKKA Artillery Academy in 1919 on the basis of the Imperial Mikhail Artillery Academy (founded 1820), which acquired its present name in 1926 and was moved to Moscow in 1938); the Budenny Signals Academy (founded 1919); The Rear and Supply Academy (founded 1918); the Timoshenko

Chemical Defence Academy (founded 1932); the Kalinin Artillery Academy (which split from the Dzerzhinskiy in 1953); the Govorov Military Engineering and Radiotechnical Academy (founded 1941); the Zhukov Air Defence Academy (founded 1956); the Gagarin Air Force Academy (founded 1940); the Zhukovskiy Air Force Engineering Academy (founded 1919); the Kuybyshev Military Engineering Academy (founded on the basis of its Imperial predecessor, in 1917); The Kirov Military Medical Academy (following directly from its Imperial predecessor); the Grechko Naval Academy (founded, on the basis of its Imperial predecessor, in 1919); and the Lenin Political Academy (founded 1919). For more detail on the role, entrance requirements and procedures see I A Kamkov and V M Konoplyanik, *Voyennye akademii i uchilishcha* (Military Academies and Schools), (Voyenizdat, Moscow, 1974). The latter concentrates primarily on higher military schools (equivalent to Sandhurst and West Point), and not the Academies.

In 1928, for comparison, five academies are listed (BSE, Vol. 12 (1928), col. 320): The Frunze, The Tolmachev Military Political Academy, the Dzerzhinskiy Military Technical Academy, the Zhukovskiy Air Force Academy and the Naval Academy. An interesting survey of the Red Army Academy (*Voyennaya akademiya RKKA*) in the 1920s is N Varfolomeyev, 'Strategiya v akademicheskoy postanovke' ('Strategy in an Academic setting'), *Voyna i revolyutsiya* (*ViR*), 11/1929, pp. 78-93. The link between visualising the character of future war and practical training of officers is clearly identified. The academy's task was to 'follow modern events attentively, study the experience of the World and Civil Wars and rework it for use by the Red Army in conditions of impending wars' (p. 78). In 1930 the Stalin Academy of Motorization and Mechanization was formed: 'Desyatiletie Akademii imeni Stalina...10 let voyennoy akademii mekhanizatsii i motorizatsii' ('The tenth Anniversary of the Stalin Academy...Ten Years of the Mechanization and Motorization Academy'), KZ, 21 December, 1940, pp. 1, 3.

197. Jomini to Milyutin, Egerton MSS 3168, f. (crossed out) 46. The Russians were applying the term 'Academy' to 'L'instruction supérieure et spéciale': the higher instruction of individual Arms of Service, and still do. In f. 47 Jomini writes only of 'l'Academie de l'Etat-Major'. It appears he decided not to bother to argue the case.

198. Ibid., 'mais cet guerre de mots ne menerait à rien'.

199. VES(1986), p. 144, 'nauchnye tsentry po issledovaniyu voyennykh problem'.

200. BSE, Vol. 12 (1928), col. 319.

201. 'A-B', 'Voyennaya akademiya pervostepennykh gosudarstv Evropy' ('The Military Academies of the First Class European States'), Vsb 11/1898, pp. 36-78. At that time, the Austrian 'Military School' was intended only for training the officers of the General Staff in the specific duties they would have to perform; that of Germany was 'as it were, a military university'; those of France, Italy and Russia combined both characteristics (p. 36). By 1910 the move towards a 'think tank' was apparent in Russia: see part 1 note 61.

202. M V Zakharov, General'ny Shtab v predvoyennye gody (The General Staff in the Pre-War Years), (Voenizdat, Moscow, 1989), (65,000 copies). This, p. 64.

203. Ibid., p.2. The book was written in 1969, but declaredly published twenty years later because it was now possible to use facts, previously considered 'closed' ('zakrytymi'). The book was a long time in production: sent for typesetting 25 July 1987: signed to press 29 December, 1988.

204. Ibid., p. 55.

205. Ibid., p. 69. 'Vnimaniye...razrabotke vzglyadov i prognozov na kharakter budushchey vooruzhennoy bor'by'.

PART 3. SOME VISIONS OF FUTURE WAR, CA. 1877-1977

1. ARMIES OF MILLIONS: THE ROAD TO WORLD WAR I

'We must exploit time and the speed of advance... It is essential that an army, moving into Turkey, should immediately deploy beyond the Balkans, not a weak detachment, but fully adequate forces for the rapid seizure of Constantinople. In other words, we now need to deploy not one, but two armies, as it were, one of which would concern itself with battle on this side of the Danube and the other - immediately after crossing, move directly on Constantinople, which would only be some 500 versts [kilometres] before it, a distance which they would endeavour to cover in five or maybe four weeks, not being distracted from this aim by any secondary considerations, by guarding their rear, by the attack of fortresses, or even by large scale operational battles [srazheniya] on the flanks.'¹

General Obruchev's comments on the Russian plan for war against Turkey, made in March 1877, envisaged an army of 100,000 to 120,000 men, fully equipped to capture a strongly fortified position, being hurled through the other army and directed at one, strategic or even grand strategic objective: Istanbul.² In fact, the Russians only deployed a relatively 'weak detachment'; General Gurko's Forward Detachment, strong enough to attain a limited objective, the seizure of the Shipka Pass, but too weak to undertake the other, strategic tasks imposed on it.³ General Obruchev's dynamic vision of Russian action in the impending war with Turkey was not fulfilled; the reality was but a pale shadow of the vision. Thus, the period under review opens with a dramatic reminder of the gap between theory and practice.

By this time, it was apparent that a revolution in military affairs was occurring, although Russian military writers never used that phrase. The previous half century had seen the introduction of the telegraph, the railway, rifled muskets, rifled artillery and, later, breech loading small arms and artillery. They had also seen the

development of more scientific assessments of foreign military power,⁴ and war games.⁵ They clearly recognized that the previous half century, a timescale often mentioned, had seen major changes.⁶ By 1876 it was obvious to Skugarevskiy, one of the most prescient and prolific writers, that

'We are living in an age of transformation. The great wars of the beginning of the century created forms of action which lasted almost a whole half century. We learned them in school, practised them, and suddenly, it appears, it is necessary to change them completely, that the character of contemporary combat is different'.

During the 1870s, Russian military theorists and staff officers understandably devoted much attention to analysis of the 1866 Austro-Prussian and 1870 Franco-Prussian Wars. The basic principles of strategy, they concluded, had not changed much. Writing about the influence of the Battle of Königgratz (1866) on tactics, in 1872, Baykov dismissed it as of no special strategic interest,

'The latest accomplishments in the omnipotent branches of technology, which have made the utilisation of strategic combinations significantly easier, have not also been able to change the basis of strategy itself, in fact, have scarcely changed it at all, since the main force in war has always been, is, and will always be, manpower strength, and the most important task is the skilful direction of this force in the decisive direction and at the decisive moment...The future...can only produce more or less insignificant changes in relation to the past.'⁸

The prevalent image of future war, which the recent European conflicts and some of the campaigns of the American Civil War(1861-65) supported, was described by Staff Captain Puzyrevskiy,⁹ in 1873:

'The general character of contemporary military action, as is well known, consists of a series of rapid marches and decisive [large] battles.'¹⁰

The dominance of the railway in determining whether superior force would be available in the right place at

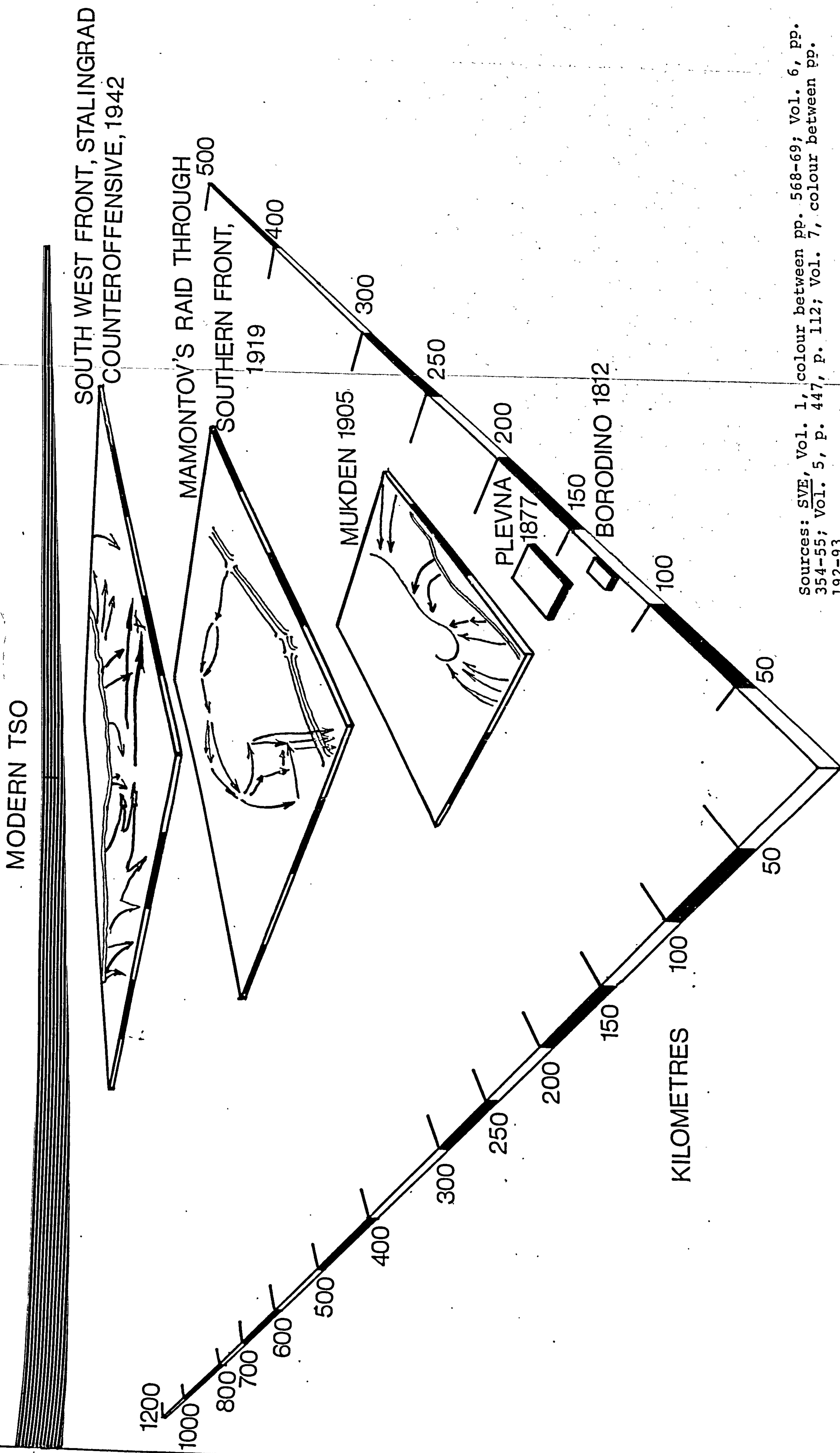
the right time was well understood, in Russia and abroad. Foreign articles were translated and taken to heart,

'It is essential to devote all energies to mobilising with all possible speed, and concentrating one's own armed forces, and acquiring numerical superiority over one's probable enemies, paralysing them by stupefaction (oshelomleniye), that is, by delivering a blow at that time, when he is still in the process of completing his strategic movement forward, and by seizing the most important border points and pieces of territory...'11

The need to prevent the enemy deploying, to paralyse his mobilisation, recurred as a theme in Russian writing about future war, not only up to World War I, but after it, up to World War II. The experience of World War I further highlighted the need to prevent the formation of a solid front. Up to World War I, this requirement in turn placed considerable emphasis on the 'strategic' role of cavalry, in keeping the enemy off balance, and keeping the front fluid. By the 1870s the Russians seem to have accepted that cavalry would seldom be used to best effect on the battlefield itself, in face of modern firearms, but would have a major 'strategic' role, as evinced in the American Civil War.¹² Major Russian manoeuvres in 1876, declaredly modelled on American practice, involved the use of a 'flying column' to outflank the main enemy force and cut the railway feeding it.¹³ From now on, the roles of cavalry were agreed as itemised in the 1877 article which featured the terms 'contemporary' and future war': masking one's own region of concentration and strategic concentration; breaking the enemy's cavalry screen and disrupting corresponding operations by him; covering one's own communications; penetrating deep into the enemy deployment, cutting communications by destroying railways and telegraph lines; and reconnaissance.¹⁴

The emphasis on large scale movements crowned by decisive battles at the strategic level did not preclude recognition of the great strength of the tactical

Figure 3.1. The expansion of the battlefield (leading to emergence of the operational level of war), in Russian and Soviet military experience



Sources: SVE, Vol. 1, colour between pp. 568-69; Vol. 6, pp. 354-55; Vol. 5, p. 447, p. 112; Vol. 7, colour between pp. 192-93

defensive, and the importance of the spade as a tool of war. The immediate aftermath of the Russo-Turkish War saw an article by A N Kuropatkin, then a staff officer, later War Minister (see part 1), called 'Before Plevna(The Practice of Trench Warfare)'.¹⁵ The use of the term 'trench warfare' in 1878 is of interest, as is the profusion of articles on the need, demonstrated by the war, for new infantry tactics and for more open formations (razsypny stroy).¹⁶

The experience of the Russo-Turkish War was the basis for the Russian 1881 Field Service Regulations. By the end of the 1890s, these were looking distinctly outdated.¹⁷

The greater size of armies, and the greater dispersion imposed by the new, more lethal weapons, meant that battles spread over a larger area. This process has continued up to the present day, and is illustrated graphically in figure 3.1. As befits this thesis, all the examples are from Russian and Soviet military experience: other nations' experience would show the same trend.¹⁸ Conversely, new technology made command and control of these larger and more dispersed forces possible, the confluence of 'historical necessity and scientific possibility' identified by Bogdanov (see part 2.6). At the Battle of Avliyar-Aladzha, in 1877, the Russians conducted a wide encircling movement to attack the Turkish position in the rear, but the assault on the Turkish position itself spread over a 15 kilometre wide frontage. The telegraph was used to coordinate the assault: previously, it had been used for strategic control but not for detailed control of forces in a battle.¹⁹

This process of expansion would eventually lead to recognition of a new level of war between the traditional areas of tactics and strategy, the operational level. With the benefit of hindsight, we can see that the

prevailing belief in 'swift marches' crowned by decisive battles: strategic movement to a tactical fight, was flawed. As the Russo-Japanese and First World Wars showed, armies would be locked in combat over extended frontages and for long periods, and this led to a new level of warfare, a problem addressed by Soviet military theorists in the 1920s(see below).

Although Russian war planning remained principally concerned with Europe, and with Germany and Austria as adversaries, during this period there were at least three interesting examples of plans for war with another major power: the British in India. The possibility of war with Britain breaking out in Central Asia was also the basis of scenarios envisioned by Russian naval theorists (section 3.3). General Skobelev(1843-82), hero of the Akhal-Tekke campaign (1880), authored a plan dated 1878 for an invasion of India. According to Sir George Clarke, the Secretary of the Committee for Imperial Defence, Skobelev's plan, quoted directly, would "organise hordes of Asiatic horsemen who, to a cry of blood and plunder, might be launched against India as the vanguard, thus reviving the days of Timur."²⁰ Nevertheless, Sir George argued that,

'reading between the lines it is clear that the author had some conception of the difficulties involved, and that in common with the projectors of all schemes for the invasion of India...he counted heavily on assistance to be received in the invaded country.'²¹

Reliance on assistance from the native population has been a characteristic of Soviet doctrine, notably in Finland and Afghanistan, but has proved excessively optimistic.

A similar scheme for an advance into Afghanistan and on to India was formulated by A N Kuropatkin (1848-1925), a key figure in strategic planning and long-term strategic forecasting(see part 1.3), in 1886. the British obtained a copy from 'a most secret source', and it was despatched to Rosebery, the Foreign Secretary, from the charge

d'affaires in Teheran. Kuropatkin considered that the possibility of war existed 'beyond any doubt'. The plan was worked out in much more detail than Skobelev's, and was clearly a realistic, professional plan to be implemented in the event of war. Kuropatkin considered that it was best to begin such an offensive 'in November, as the weather is healthier for the men and all the Russian ports will be frozen.'²²

A last indication of Russian views on future war with British India emerges from an ostensibly historical work, by Lieutenant General Kishmishev, published in 1889 by the Staff of the Caucasian Military District.

Kishmishev's Nadir Shah's Expeditions to Herat, Kandahar and India...analysed the routes to India in detail and especially Nadir Shah's exemplary capture of the Khyber Pass in 1738. However, it was not illustrated, as one might expect, with historical maps but with up to date Russian General Staff maps, complete with railways.²³ There can be little doubt that Kishmishev was drawing detailed and specific lessons for future operations against British India.

During the 1880s there was a new technological development: the introduction of so-called 'smokeless powder', in fact not powder at all but new propellants akin to those used today.²⁴ Besides being virtually smokeless, which added to the already marked superiority of the concealed defender over the attacker in the open, the new propellants permitted smaller calibres ('malokalibernoye oruzhiye') and, being more powerful, gave the bullet a flatter trajectory making it lethal over a longer distance. Finally, smaller rounds permitted a magazine carrying several rounds, and permitted the soldier to carry more of them, increasing rate of fire and ammunition expenditure. The great Russian scientist, Dmitry Mendeleev, produced a smokeless propellant called pyrocollodion between 1887 and 1891. In the latter year

the rifle developed by Major General S I Mosin (1849-1902) was introduced, which remained in service with minor modifications for some sixty years.²⁵ Of all the rifles in use by the major powers at the outbreak of World War I, the Mosin M-1891 with its 7.62 millimetre calibre and high muzzle velocity was, in its resemblance to later rifles, the most 'futuristic'.²⁶ The small calibre rifle using smokeless powder was a major subject of analysis in the 1890s.²⁷

Of the Russian authors who addressed this issue, the most prominent, who proved to have the greatest potential was General N P Mikhnevich (1849-1927). Beskrovny characterizes him as 'the strongest (nayboleye krupny)[Russian] military theorist of the early 20th century'.²⁸ Mikhnevich's Influence of the Latest Technological Inventions on Forces' Tactics (first published 1893, also published in 1898)²⁹ concentrates principally on the effects of the improved small arms, and rather neglected the parallel, and potentially even more revolutionary improvements in artillery. Mikhnevich forecast that fighting formations would become shallower, and that rifle fire would increase in importance. Smaller detachments would act independently in the front line, and there would be greater distances between them. He reckoned, with grim realism, that there would be 50 percent casualties among troops in the forward units, and proposed that this be taken into account when calculating the forces necessary for a given task. Because of the very flat trajectory of the the new, small calibre rifles, the distance between advancing lines would have to be increased, and troops within range of enemy small arms would have to move at the double at all times except when under cover (for centuries the normal mode, except in then final assault, had been to walk).³⁰ The preparatory period, or 'fire fight', would be prolonged, and the new, long ranged artillery would be dispersed, but would not

lose its ability to concentrate its fire on a given target, indicating that Mikhnevich recognized the possibilities created by evolving systems of indirect fire, discussed below. However, he thought it necessary to push the infantry forward rapidly, to protect the artillery.³¹

Mikhnevich then returned to the relationship between the attack and defence. Noting that 'smokeless powder' would enable those under cover to remain relatively undetected, while exposing those in the open, who would not be shrouded by the smoke of battle, he saw that the attacker would have to make more careful use of ground. However, Mikhnevich argued that similar considerations had always applied to attack and defence, and that more powerful weapons would give the more mobile attacker the ability to concentrate fire on the defender once the latter had revealed his position. Thus, Mikhnevich concluded that the relationship between attack and defence would remain much as before.³² Mikhnevich's vision of future warfare dominated by accurate rifle fire and advance in dispersed lines was accurately reflected, for example, in the tactics which the British evolved during and after the Boer War, and used in 1914.

Similar conclusions were reached by the French General Langlois, writing in 1904. Improvements to the rifle increased the difficulties of frontal attack by infantry alone and gave an increased power of resistance to field fortifications. The same developments enhanced the value of the flanking or enveloping attack: the problem which emerged was that increased dispersion and increased numbers of troops clogged up the battlefield. The greater range of weapons would heighten the manoeuvring power of artillery, and other heavy weapons (machine guns): because of their range, they did not have to be right 'up front'. Langlois did in fact recognize that battle fronts would increase with the increased effective range of

weapons.³³

The British Field Service Regulations of 1909 similarly recognized the front firing lines extending and the battle breaking up into a 'series of distinct engagements, each raging around a different locality and each possibly protracted over many hours'.³³⁴ This did in fact occur, contributing to the emergence of the operational level: the individual engagements were tactical: the scheme that united them was not 'strategic', since it was purely military and involved a continuous front. It was a component of a strategic aim.

The unseen factor was the artillery, 'the hurrying batteries beyond the masking hills'.³⁵ Artillery had utilised methods of indirect fire, that is, fire at targets invisible to the guns themselves, for centuries: the Russians had surprised the British with it at Sevastopol.³⁶ Indirect fire for field artillery became a major issue after the Franco-Prussian War, because the new small arms and machine guns gave infantry a temporary ability to kill the exposed gunners at long range, whilst the artillery could not use its greatly increased range to the full while it was limited to the range of human eyesight and the visible horizon. This issue, largely ignored by military historians, and its implications for the Russian Army, has been the subject of published monographs by the author, included as Appendix G.³⁷ The Russian artillery fully understood the possibilities of indirect fire, and designed the new M-1900 field gun with an indirect fire sight, tested from 1896 and approved from 1898 (see Appendix). Nevertheless, the staggering potential of indirect fire to completely alter the picture of the battlefield, the 'kartina boya', a concept used by Milyutin,³⁸ appears to have been largely absent from the other arms' assessments. This may in part have been due to the technocratic tendencies of the Russian Artillery. It is noteworthy that in 1896, when the indirect fire

debate was at its peak in the artillery arms of all the major European powers, the Russian Artillery Journal waxed philosophical about the difficulties of forcing institutional acceptance of change.

'A new idea is always pursued by more energetic people than is the old order and core principles ...by the advocates of reform. This has a simple cause. The majority of people are directed from within: they follow habit (privychka), fashion (moda) and the established social opinion...to give this thought a different direction...in a word, is very difficult. It is even more difficult because, in order to get a new idea through, all one's strength of conviction is needed to ³⁹..reject that which this idea must replace.'

The idea that artillery did not have to be able to see the target over open sights, but could conceal itself in the sinuosities of the ground and fire on mathematical data, plus corrections passed by flags or telephone (or, later radio), was probably the most difficult idea to convert into an overall picture of the new, extended battlefield. As part 2 has noted, it is key example of paradigm change in military science.

This leads naturally to the Russian work on future war most widely known to non-Russian and Soviet military specialists, Ivan Bliokh's Future War in its Technical, Economic and Political Relations, the final version of which appeared in 1898.⁴⁰ Like many works that are widely cited, it appears to be little read, and the context in which it appeared and the influence it had understood even less. Ivan Stanislavovich Bliokh (1836-1901) was an eminent Warsaw economist, statistician and financier, and certainly did not write the entire work himself: it was the work of a 'collective', which Bliokh initiated and directed.⁴¹ As president of the Kiev, Brest, Libau and Lodz railways, Bliokh had supervised a major work on Russia's railways, published in 1875.⁴² He was no stranger to questions of economic planning, to which

military questions were obviously related.

By the beginning of the 1890s Bliokh had begun to publish on the possible economic consequences of a future major European war. Based in Warsaw, which lay at the centre of the Russian Empire's salient sticking out between German and Austrian territory, Russia's 'sword arm, as Marx described it, an image of which Bliokh was also aware.⁴³ Bliokh could not but be acutely sensitive to the possible effect of war on that city. Early research which developed into the final work was published in the journal *Russkiy vestnik* in 1893-94, and a work on the Economic Difficulties of Central European Countries in the Event of War was published in 1894.⁴⁴ In 1893, the French Consul in Warsaw wrote to his Minister of Foreign Affairs, describing Bliokh's work. The siege of Paris in 1870 had made him conscious of what might happen to a civilised metropolis suddenly besieged, and that the authorities had not taken prudent measures.

'L'auteur fait connaitre au debut les circonstances dans lesquelles il a été amené a entreprendre cette publication. La guerre de 1870 dit-il, a présenté le seul exemple contemporaine de l'investissement complet, ou à peu près complet, d'une grande capitale comptant une population nombreuse. Maleureusement les autorités ont marché toujours au hazard...'⁴⁵

As with Paris, a siege would compound existing grievances: the Poles had rebelled against the Russians in 1831 and 1863 and were regarded as 'antipathetic'.⁴⁶ Bliokh had therefore

'a cet effet, institué, il y a quelques années, une commission technique chargée de lui soumettre un ensemble de mesures relatives a l'approvisionnement de la ville. La Chambre de Commerce, dont M Bloch est président, a été également appelée à donner son avis, [he was at that time abroad]...il a resumé ses appreciations dans une notice spéciale relative à la situation économique dans laquelle la ville de Varsovie pourrait se trouver pendant la prochaine guerre'.⁴⁶

The work which Bliokh directed is therefore an illustration of the need to see articles and passages in Russian and Soviet writing about future war in their proper operational, technological, documentary, institutional and even personal context. Absence of this has been a major flaw in much of the secondary work surrounding Future War.... It is quite unacceptable to take descriptive passages about future war in isolation. Western historians are rightly impressed by the similarity of the future war described in the work to certain aspects of the First World War which began sixteen years after publication of the full study. Yet they frequently view it out of its social and documentary context. Clarke, for example, described Bliokh as an 'amateur' and opined that 'nobody will ever know what the Russian generals made of the book'.⁴⁷ The work directed by Bliokh, as demonstrated, evolved from a personal and professional concern with the fate of Warsaw in a major war, and was written with a further specific purpose in mind: to elicit support for the creation of a mechanism to resolve disputes by peaceful means. According to the entry in the last Imperial Russian Military Encyclopedia, Bliokh in fact obtained advice from the principal foreign General Staffs, and the Russian General Staff.⁴⁸ Bliokh had taken

'all imaginable pains in order to master the literature of warfare, especially the most recent treatises upon military operations and the handling of armies and fleets which have been published by the leading military authorities... [He was] glad to know that there is not much difference of opinion as to the accuracy of my general conclusions as to the nature of future warfare'.⁴⁹

This is even apparent from W T Stead's interview with Bliokh which prefaces the British edition.⁵⁰ Bliokh's bibliography also reveals the most assiduous attention to informed writing by contemporary military professionals. The Bibliography in the Polish edition of the General

Conclusions... contains two works by Mikhnevich, three by Dragomirov, five by Puzyrevskiy and six by Leyer,⁵¹ and references to them appear frequently in the text. One of the most vivid descriptions of future land warfare in the text of the General Conclusions is taken directly from a French Captain, Nigote.⁵²

Clarke's ignorance of 'what the Russian generals made of the book' is surprising. When it was published, it was reviewed by at least two highly influential and very well known officers: Puzyrevskiy (located in the Warsaw Military District), and Dragomirov.⁵³ Dragomirov's reaction to the work was published in the quality military paper Razvedchik (Scout): Puzyrevskiy wrote a review for the Warsaw Daily, and this was also reprinted in Razvedchik.⁵⁴ Dragomirov was sarcastic in the extreme,

'You would like to know my opinion on your works on military affairs. Forgive me for being blunt, but it gave me the impression of a compilation which was painstaking and slow, and not always logical...In compiling your work you have expended (or used up), 1) a lot of your nervous energy, 2) a mass of pen nibs, paper, writing and printer's ink; 3) expended (that is, in relation to yourself, destroyed) a fair sum of money. And thus, as in all things creation invariably involves destruction; without destruction, creation is unthinkable, in whatever field.'⁵⁵

Dragomirov, a great exponent of the bayonet, was particularly critical of the Bliokh study's comments on the diminished role of cold steel in future war.⁵⁶

Puzyrevskiy's review contained many of the classic reactions of a military professional to work by a 'civilian analysts', it is true, which have a decidedly modern ring. Indeed, the similarity to the reactions of the Soviet military to the current efforts of analysts working for ostensibly non-military institutions (see part 4) is striking. However, reviewers respected the Bliokh study's handling of the technical matter.

'Why should it be necessary for the author to expend such effort, time and means, on the study of purely military questions? To what degree can he count on being authoritative, being practically completely alien to military matters? What is the market for this work? ... [na kakikh chitateley razschitana eta rabota] pursuing a completely peaceful [here, this could be translated as pacifist] aim, - universal disarmament and the solution of international disputes by a court of arbitration, the author relies, not only on the usual arguments, brought in to support this unfruitful aim, but also to show that the resolution of such questions by arms in the presence of modern, colossal, peoples' armies, technologically sophisticated materiel and social relationships is impossible [sic.-nevozmozhno]... the honourable author has tried conscientiously but, unfortunately, his work is deeply tendentious'.⁵⁷

As Chief of Staff of the Warsaw Military District from 1890 to 1900,⁵⁸ Puzyrevskiy should have known very well why the eminent financier and economist, a pillar of Warsaw society, had become interested in 'purely military questions'. The criticism would appear to suggest an element of professional and personal jealousy, and the possibility of anti-semitism playing a part cannot be excluded. Puzyrevskiy challenged some of Bliokh's technical conclusions, citing the evidence of the contemporary Spanish-American War.⁵⁹ This was not totally persuasive: the Spanish-American conflict was the last 'black powder war', and Bliokh was predicting what would happen in the era of smokeless powder. A major conflict, the second Anglo-Boer War (1899-1902) which began the following year seems to have borne out many of Bliokh's predictions.⁶⁰ Another Russian reviewer was more specific; Bliokh's treatment of the military-technical component, the influence of weapons on tactics, was not to be faulted, but only the human element

'To study the technical part is not difficult, to determine this or that effect of smokeless powder even a "non-specialist in military affairs" can do... but he cannot understand the essence of the matter, the aim and basis

of military art...Such understanding comes only from love for the military profession.'⁶¹

Nor need there be any dispute about the extent to which Bliokh's ideas percolated into the Russian Army. A committee headed by the war minister, then General Kuropatkin, reported to the Tsar that the book was useful and should be required reading for members of the Russian General Staff.⁶² The work very rapidly achieved 'great popularity among the forces, in spite of its colossal size'(!)⁶³ Therefore, to take the descriptive passages in the study *in* isolation, to portray Bliokh as the amateur who got (some) things right when the professionals all got it wrong, is misleading and inaccurate.

The complete 1898 Russian edition of Future War... comprises six fat tomes, magnificently illustrated with pictures of military equipment, battles, graphs and diagrams. The first volume contains most of the military-technical information. Beginning with a section called 'General Remarks on Fire', it deals with the then recently introduced smokeless propellants and high explosive bursting charges for shells, small arms, artillery and fortifications, the significance and role of cavalry, the action of infantry and artillery in combat. It uses photographs from French manoeuvres, and depictions of the battles of Plevna and includes references to Mikhnevich's detailed analyses.⁶⁴ Volume two is entitled The Strength of European Armies. Preparation for and Declaration of War. It includes sections on the command of armies, 'On the Battlefield', 'Fortress warfare', 'The State and Morale of Armies', and 'War Plans'. It deals with specific future war scenarios, once again using a mass of professional literature, for example some 18 German works on the character of a future German-Austrian-Russian war.⁶⁵ Volume three covers the future of war at sea. Volume four deals with the economic difficulties which would arise in war and is accompanied

by a separate volume of graphs. Volume Five is entitled A Peaceful Way of Solving International Disputes and covers socialism, anarchism and anti-militarist propaganda, losses, casualties and medical factors including photographs illustrating the effect of bullets on live targets. Volume six, the General Conclusions, gives a broad overview of how Bliokh and his associates believed war would be waged. The smokeless battlefield, the perfection of rifles, artillery and explosives would all influence the nature of warfare, and so would the employment of massed armies.

The General Conclusions contain marginal references to the earlier more detailed volumes. The authors noted the increased size of the future battlefield and the problems which this would pose for command and control. Europe had no generals experienced in leading armies of the size now available, and the most agile mind would not be able to embrace and combine all the details, requirements and circumstances present on the immense battlefield.⁶⁶ The same problem affected junior commanders. One French authority is cited, who opined that immense skill would be needed to command infantry on the battlefield. In no army would 100 officers fit to lead a company under fire be found in every 5000 (the English edition gives 500, an error).⁶⁷ The nature of the future battlefield is described with great accuracy, acknowledging the debt to the military writers consulted:

'Sheltered behind such works [trenches] and in a position to devote all their energy to fire against the enemy, the defenders will sustain comparatively light losses... the war of the future will consist primarily of a series of battles for possession of fortified positions. In addition to field fortifications of various kinds, the attacking army will have to deal with auxiliary obstacles which will be met with in the neighbourhood of fortifications, that is, in the very position where they will be subjected to the greatest danger from the enemy's fire, obstructions formed of beams,

networks of wire, and pitfalls. To overcome these obstacles, great sacrifices must be made.⁶⁸

The General Conclusions describe 'huge hordes' (gromadnye polchishcha) equipped with completely new explosives of terrible power, and firearms with incomparably greater range and lethality than before.⁶⁹ The general kartina boya - picture of the battlefield - has left an indelible mark on historiography, and it is understandable that the inaccurate predictions should have been overshadowed by the general similarity of what is described to the actual appearance of World war I:

'The huge extent of the theatre of war, the vastness of the battlefield, the difficulty of attacking trenches, various obstacles and fortifications, and also natural cover, which soldiers are now taught to utilise and which will inevitably utilised in view of the terrible power of fire, will make massed attacks against one another impossible, and by the same token attacks with the bayonet...finally, the protracted nature of battles(prodolzhitel'nost' bitv), which may last for several days and, due to the impossibility of pursuit, yield no decisive results: all these things are new circumstances (obstoyatel'stva noviya).⁷⁰

The point about the impossibility of pursuit was perceptive, in view of the problem First World War armies found in exploiting a breakthrough. In both Russo-Japanese and First World Wars, armies could maul each other horribly but generally fell back intact as organizations, mirroring another comment from Future War... 'in these circumstances only a greater or lesser degree of mutual annihilation will take place, without decisive result'.⁷¹ Armies could fall back along communication still intact far faster than one which had achieved some success could advance over shattered terrain and communications.⁷² The study was also correct to forecast the end of massed bayonet attacks. In spite of the persistent fascination with cold steel, the bayonet accounted for only 3 percent of Russian casualties in the

1877-78 Russo-Turkish War and 0.3 percent of British casualties on the western front in the Great War.⁷³

The study also appreciated the cardinal role of communications and intelligence. Bicycles, carrier pigeons, field telegraphs and telephones, apparatus for signalling by day and night, photography, watch towers and balloons, would 'all do away of that insufficiency of information which formerly prevented united and successful operations'.⁷⁴

Although completed only five years before the first flight of a heavier than air machine, there is no allusion to the possibility of the heavier than air aircraft, although dirigibles were highly developed (the problem of predicting the development of basic technology itself: see part 2). It was the aeroplane that proved the most versatile, effective and feared instrument of reconnaissance at the beginning of the Great War.⁷⁵ Nor is there a direct suggestion that the internal combustion engine might be used to carry armour. In volume 1, the compiler(s) ask 'might we not see people going into battle in future war v pantsyryakh - encased in armour, like medieval knights'.⁷⁶ There are pictures of mobile wheeled shields,⁷⁷ but their inconvenience -neudobstvo - was noted. There appears to have been no attempt to link these with the possibilities of mechanical traction, although the use of cars and trucks to carry men and supplies up to the front is suggested.⁷⁸

This brings us to Future War...'s greatest omission with regard to the true character of the battlefield in the next war: the lack of appreciation of the effect of the indirect fire techniques being discussed in all Europe's artillery journals during the 1890s (see Appendix F). In the section on artillery in Part 1, the compiler(s) alluded to Martynov's 1894 work Strategy...⁷⁹ In future warfare, artillery would have an effect equivalent to small arms fire at between 1000 and 2,400 metres, and came

into its own at ranges beyond that. But how was it to utilise this range? The compiler was aware of the possibility of 'the use of artificial aiming points (fire at targets invisible to the layer)'.⁸⁰ However, this was noted with concern as it would make 'fire over the heads of one's own troops very dangerous'.⁸¹

When Future War... was being written, field guns had maximum ranges of up to seven kilometres, permitting their deployment in what was considered great depth at the time, but the connection that the only solution to the various problems would be the general adoption of indirect fire was not made. The compiler was aware that infantry's adoption of entrenchments would mean that the conduct of the battle would devolve on the artillery to a large extent,⁸² and he described counter-bombardment, the artillery of both sides indulging in mutual annihilation.⁸³ There is, however, no suggestion as to how the enemy artillery (which would probably be invisible, or nearly so), was to be located, of the complex problems of mapping, target location and acquisition which the general adoption of indirect fire would create. Although indirect fire techniques are mentioned, in painting the battle picture, the compilers of Future War... seem to have envisaged only direct fire, with artillery in exposed positions.

The compilers concluded that fortresses would exercise an 'unprecedented influence' in a future war, a view which the fortress engineers of the time certainly encouraged.⁸⁴ The debate as to the value of permanent fortifications raged after the fall of Port Arthur, and continued to do so throughout World War I. However, although some wrong conclusions were undoubtedly drawn, the experience of World War I bears out the compilers' emphasis on the significance of fortresses. One may cite the role of the Belgian Forts in the opening campaign in the west in 1914, inflicting critical delay on the Germans; the French use

of their forces as a mobilisation screen; the Germans' use of Königsberg to launch their offensive across the Neman, the Austrians' use of Craców as a base of operations; the siege, capture and re-capture of Przemyśl during 1914-15, and the 'worst' battle of the war, that which raged around the fortress system of Verdun.⁸⁵ The question of fortresses has renewed relevance today, in the light of Soviet declarations of a defensive strategy and the role of strong points (see part 4).

The views expressed on the employment of cavalry concur with those of the professional military writers. Cavalry detachments would be launched deep into enemy country, to impede mobilisation and concentration, and also to destroy means of communication, storehouses and so on. These cavalry deep strikes would naturally have an impact on the civilian population (and possibly the government, as Pilsudski found with Budënný's deep raid in the 1920 Soviet Polish War).⁸⁶

In the same year as Future War...'s final publication, 1898, a major work on 'Cavalry in Contemporary Wars' by Fedor Gershel'man was published in Voyenny sbornik, which supported the Bliokh study's observations on cavalry and is of particular interest in terms of future war in general. Three principal new factors affecting warfare were identified: demographic - more numerous forces; the superiority of modern firearms making combat (the tactical battle) more complex; and railways.⁸⁷

The seminal work to which many authors turned was G A Leyer's Strategy. Leyer (1829-1904) had served in the Caucasian Wars of 1817-64 (a prolonged conflict which contains many precedents for current Soviet security concerns: see part 4), and had been a professor at the General Staff Academy since 1865, which he headed from 1889 to 1898.⁸⁸ Much of Leyer's work was concerned with the development of the methodology of the military sciences, with particular stress on the value of military

history, rather than painting a specific picture of what future war might look like.⁸⁹

In his final work, published in three parts in 1898, Leyer described Major operations, principally a treatise emphasizing the importance of operational lines, preparatory operations (Bases, concentration of forces and supplies) and, thirdly, special operations: steppe and mountain operations (an interesting distinction based on 19th century Russian experience), and mixed operations: naval, coastal and riverine. He conceived in embryo the idea of the operation as a 'combination of separate manoeuvres and individual actions, linked by a general idea and a general aim'. This new idea did not meld easily with his concept of operational lines, or his emphasis on eternal and unchanging principles.⁹⁰ This definition presaged that devised by Svechin in the Soviet period (see below). He also developed the idea of the strategic reserve and the interrelationship between politics and strategy: as tactics were directed by strategy, so strategy was directed by politics.⁹¹ Leyer dominated the theoretical basis of Russian military thought for nearly half a century, although not everyone agreed with him, particularly Puzyrevskiy and Petrov. Leyer's work was highly esoteric, and is not as popular with Soviet historians as Mikhnevich and, a generation younger, Neznamov (1872-1928), but his Strategy... was exhaustively cited at the time, by Bliokh and Gershel'man, for example.⁹²

In painting the general picture of future warfare on land, Gershel'man cited Leyer's view that there would probably be a million combatants (1.2 million with associated non-combatants), in a given theatre, split into perhaps five separate armies of 150,000 to 200,000 each, divided into five corps. The image of the expanding battlefield was utilised: in Napoleonic times, a 200,000 strong army might advance on a 100 or 200 kilometre front;

by 1815, half a million men over 400 kilometres. Now, a million strong army (a popular image) would advance over an 800 to 1,000 kilometre front (a view also cited by Bliokh).⁹³ Whereas in the 1870s the idea of swift marches and decisive battles (see above) had been dominant, Gershel'man now believed (correctly) that future armies would be less mobile, less flexible. This was

'Evident in itself and fully supported by the experience of military history. In particular, the movement of armies, their concentration, will require [potrebuyet - perfective case] more time, every wrong direction, every mistake, will take longer to correct, in a word, there will be a certain slowing down in the development of all strategic operations.'⁹⁴

Armies with the new weapons would be more dependent than ever on supply from the rear,⁹⁵ a view repeated later with additional emphasis on the increased significance of railways, as an introduction to the potential value of cavalry.⁹⁶ Combat (the tactical level) would also take place over 'a huge extent': several tens of kilometres, a correct conclusion, as figure 3.1 illustrates, with the 'hurling in' of 'gigantic masses'.⁹⁷ Direct control of individual operations by the commander-in-chief would be impossible, another point where the Bliokh study concurred with the professionals.⁹⁸ Gershel'man envisaged deep penetrating cavalry capturing senior military officers and civilian officials and their subordinate staffs, linked with the aim of disrupting the civil government also suggested in the Bliokh study.⁹⁹ A final perceptive general point was that large armies of short-service conscripts and reservists would be far more aware of political ideas, and the army's morale would depend more and more on the morale of the populace as a whole.¹⁰⁰

In the light of this overall slowing-up of operations, the increasingly cumbersome and lethargic movement of increasing masses, cavalry was seen as the arm 'best able to save time and space'.¹⁰¹ The value of its special

mobility would be enhanced. Against this background, the author then reiterated the familiar missions of cavalry, unchanged since the 1870s: to cover mobilization and concentration in the theatre of war; to seize important points in frontier areas; reconnaissance, and impeding the enemy's mobilisation and concentration.¹⁰² These were, virtually word for word, the missions enumerated in the 1877 article and the Bliokh study (see above).

Nor were these views inaccurate. They were certainly not unreasonable for 1898. A decade later, there were those who considered that air reconnaissance and the wireless would make it easier to spot cavalry movements and report them, so that infantry detachments could be rushed by car or bicycle to head them off.¹⁰³

Interestingly, these writers saw the aeroplane and the petrol engine as only working against the deep penetrating, manoeuvre force: in fact, they would ultimately give it a new and more violent lease of life, an illustration of the danger of one-sided analysis of the effect of new technology on warfare.

The cavalry missions described in these official and unofficial works presage pre-emptive strikes by mechanized forces against a partially deployed enemy and the 'advance guard echelon' of the 1930s (see below). Cavalry played an important part in the opening manoeuvre phase of World War I, and remained the principal arm of exploitation available throughout it. As late as 1917-18, it was believed that a decisive breakthrough of the German continuous front in the west would have to be energetically exploited by cavalry, to stop the Germans destroying the railways which would enable the follow-on forces to advance.¹⁰⁴

Gershel'man's view that armies would be less mobile and less flexible reflected a debate that had begun earlier in the 1890s. It was the subject of an exchange between A Petrov and Captain E A Martynov in 1894.

X Martynov's book Strategy in the Age of Napoleon I and in our Time, (extracts in Appendix B) addressed this theme, which had occupied German theorists, notably von der Goltz, for some time. Martynov concluded that the mass army would bring about a decline in Military Art. The art of strategy had declined, as its 'higher, creative side' had become 'more and more subordinated to technology'. In the present situation, it was 'impossible to attain the previous artistry in operations'.¹⁰⁵ In an article called 'Tasks of Modern Strategy (with regard to Captain Martynov's Work "Strategy")', Petrov compared the development of warfare to the development of industry where fewer, but more highly skilled workers were employed.¹⁰⁶ He dismissed Martynov's conclusions about the effect of mass armies, citing ancient statistics numbering armies in hundreds of thousands (which were, it is now generally acknowledged, completely unreliable),¹⁰⁷ and the half million engaged on both sides at the 'Battle of the Nations' at Leipzig in 1813. In comparison, the armies of 1866 appeared quite streamlined.¹⁰⁸

'Therefore, one cannot affirm that in future wars million-strong armies will operate, the more so, since such armies in the strategic sense will rapidly become a burden [bremya] for the commander, because of superfluous mass, hindering his operations, riveting him to railway lines, ...creating quantity instead of quality. In opposition to that, one could argue, that in future economic causes will lead to 'fatal necessity' reducing the size of armies, especially in peace time... according to all the facts, both strategic, and economic, masses must be reduced and their quality increased.'¹⁰⁹

Martynov responded with 'a few words in Explanation and Development' of his work. Mass armies existed, and (like nuclear weapons at the time of writing), could not be disinvented. Nations were not interested 'in the purity of strategic [military] art, but in military success', and a return to small professional armies was 'completely

impossible.¹¹⁰ The same issue was explored in Britain by H G Wells in War and Common Sense (1913) and The War that will end War (1914), and remained an issue during World War I.¹¹¹ An article published in the quality daily Russian Gazette, at New Year, 1915, noted the opposing forces at work in modern war: increasing mass, which should logically lead to greater densities in order to enable the commander to retain control, and modern weaponry, which required more and more open formations and greater individual initiative.¹¹² The conclusion of this heated debate was summarised in an 1898 article by Mikhnevich on whether or not million-strong armies would be deployed,¹¹³ and in Mikhnevich's seminal two volume Strategiya (Strategy), published in three editions (St Petersburg, 1899-1911).¹¹⁴ Mikhnevich made a remarkably bold prediction of the appearance of future war, and sensed the cardinal role of technology therein. and that it might restore the balance in favour of the commander's exercise of operational and strategic skill.

'With the widespread use of field fortification, in connexion with long-range rapid-firing weapons and huge deployed masses, combat, as in the American war (1861-1865) will last 2 to 3 days; Therefore, having available in the rear a railway network well equipped for military movements, it may be possible to bring along them a significant mass of forces (a strategic reserve) to a given [selected] sector of the front, and with it the commander will create that evenement (historical event), of which Napoleon spoke... New, powerful factors - electricity and steam, which have increased the contemporary army to colossal dimensions, can increase the power of the commander correspondingly.¹¹⁵

The full implications of these discussions can only be seen with hindsight: the participants cannot have had any idea how their words would come true. Martynov's view of the deadening effect of massive armies colliding like rams, of the constricting dependence on railways, of logistics dominating strategy, and equally wooden

generalship, was certainly reflected in the much of the character of World War I. Petrov's view, that smaller, higher quality armies would evolve, corresponding to the evolution of industry, would become popular among military thinkers in the 1920s and 30s, and may at last be realised in the post reduction environment of the 1990s.

Mikhnevich inadvertently described the deliberate selection of a portion of the front for an offensive, and the laborious deployment of troops and supplies for it which came to characterize both fronts in World war I. However, his instinct about technology, and its ability to affect both sides of the equation was perhaps vindicated in World War II, by the command, control, communications and intelligence opportunities provided by radio, radar and Ultra, and by renewed battlefield mobility provided by petrol and diesel, rather than steam.

The 1890s certainly evinced a lively interest in technology. An article in Voyenny sbornik in 1900 appeared suitably futuristic: the new French monorail system, and its possible use in military operations.¹¹⁶

The events of the 1904-05 Russo-Japanese War arguably reflected these visions of future war. Kuropatkin, the Russian Commander-in-Chief, appears to have endeavoured to bring the Japanese to a decisive 'battle of annihilation', as envisaged in the 1870s, but the size of the armies involved and the extension of the battlefield precluded this. Kuropatkin's gradual withdrawal northwards, along the artery of the Dal'ny/Port Arthur -Telissu - Tashihchao -Liao Yang - Mukden railway line was a perfect reflection of Martynov's image: an inflexible dead weight riveted to a railway line. In the Battle of Mukden, the battle lines extended over a front of 155 kilometres, and the battle occupied an area 80 kilometres deep. Over half a million men were involved on both sides. Bliokh had forecast battles lasting several days: this extended operational battle (srazheniye) lasted

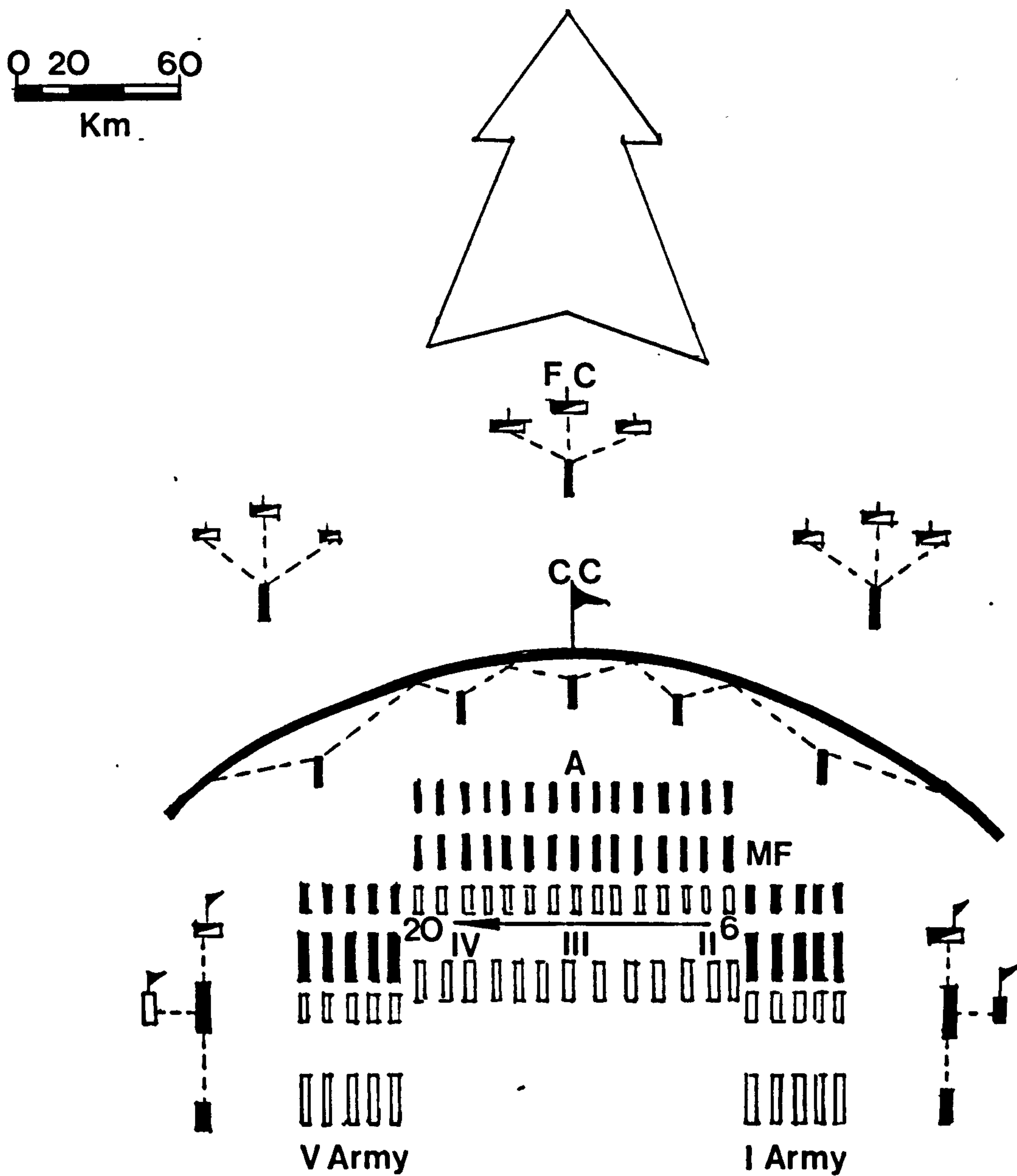


Figure 3.2. Mass army on the march (Mikhnevich).

CC = corps cavalry
 FC = forward cavalry

Armies are shown with Roman numerals. Each comprises five corps, so armies II to IV comprise corps numbers 6 to 20.

nearly three weeks, from 6(19) February 1905 to 25 February(10 March).¹¹⁷ Although Marshal Oyama attempted an envelopment, the Russians were able to extricate themselves and withdraw northwards.

The problems of handling the millioned armies of the future continued to preoccupy Russian thinkers up to World War I. Given the inflexibility of mass armies, it was essential that they coalesced in the right place and at the right angle, ready to roll into battle. This was seen as a development of Napoleon and Moltke's practice of concentrating their armies on the field of battle. Moltke referred to the latter as 'the highest thing which strategic [operational, in the modern sense] command can achieve.'¹¹⁸ Mikhnevich continued to work on the assumption that individual armies would comprise 150,000 to 200,000 men, divided into five corps, reflecting Napoleon's view that the span of control of a commander at any level was limited to five subordinate levels, a view still generally accepted.¹¹⁹ The millionaire army (army group) envisioned by Mikhnevich comprised five independent armies, and would occupy an area of 150 kilometres breadth and 220 kilometres depth as it moved (see figure 3.2).¹²⁰ The critical unfolding into battle from the configuration used for movement was known as the 'march-manoevre', defined by Mikhnevich as 'the grouping of Army Corps during movement', which depended both on the conditions in which movement took place and the 'desired first objective' (presleduyemaya blizhayshaya tsel).¹²¹ The concept of the march-manoevre was cardinal, and the term remained in use in Polish, to describe World War II battles, until at least the late 1950s.¹²²

Aleksandr Neznamov, a Lieutenant Colonel on the Staff of the General Staff Academy, also devoted much attention to this problem. Between the Russo-Japanese and First World Wars, he lectured at the General Staff Academy where

his students included Shaposhnikov (1882-1945), who graduated in 1910 and later headed the Soviet General Staff.¹²³ In Contemporary War: the Action of Field Armies (1912), Neznamov enunciated many of the terms associated with modern Soviet military writing.¹²⁴ Having defined the 'objective of operations' as the enemy army, Neznamov referred to the 'first immediate objective'. Whereas the aim of the first operation should be established by the war plan, the first immediate objective could only be decided by the commander on the spot.¹²⁵ This was the same distinction that Mikhnevich had made between the war plan and the plan of campaign. Neznamov then discussed the meeting operation (vstrechnoye operatsiya), and the movement of forces to the theatre of military operations (teatr voyennykh deystvii), both modern Soviet terms. He cited the eminent German authority, General Dr Hugo von Freytag-Loringhoven (who began his career in the Russian Army), on methods by which an army can switch its direction rapidly in close proximity to the enemy. Neznamov was a keen student and analyst of German authorities, immediately before World War I, both Freytag and Schlichting.¹²⁶

Neznamov used the term srazheniye to mean a battle at what we would now call the operational level (see below), as opposed to a tactical battle or combat (boy), exactly as in modern Soviet terminology. Until the appearance of the modern concept of the operation, the srazheniye, or major battle, was the principal form of action, and objective, of armies.¹²⁷ Neznamov's concept of warfare differed somewhat from the modern Soviet one, in that he saw every operation leading to a srazheniye, whereas the modern operation is itself a continuous battle, and need not culminate in a separately identifiable great battle. Neznamov dealt with the operational meeting engagements (vstrechnoye srazheniye), which he defined as any engagement which unfolded simultaneously with deployment,

and the offensive against an enemy deployed in position.¹²⁸

The latter was seen in terms of the advance of several columns, which might be divisions within a corps or corps within an army. Having the advantage of position, the enemy could afford to deploy fairly thinly, leaving a large mobile reserve to deal with outflanking movements. This was also envisaged in the Field Service Regulations of the other major European powers.¹²⁹ Frontal assault was always difficult and against an enemy in a prepared position, was 'all the more unlikely to succeed'.¹³⁰ Therefore, a decision 'had to be sought on the flanks'.¹³¹

It is perhaps ironic that professional military thinkers before World War I were so convinced that frontal assault was futile that they did not address its conduct. Therefore, commanders were totally unprepared when, two years after Neznamov wrote, they found themselves without the option of doing anything else. The mass armies envisaged by the pre-war writers spread across the entire landscape, leaving commanders with no elbow room for manoeuvre at all. This was not as much of a problem for the Russians as it was in the west, but positional warfare nevertheless set in on the Eastern Front about a year after it had in the west.¹³² The solution, paradoxically, lay in smaller scale manoeuvre within the tactical zone: for example, the intricate tactical combinations, and especially the infantry-artillery cooperation practised by the Germans and Austro-Hungarians in 1915, by Brusilov's forces in 1916, by the Germans in March 1918.¹³³ The decisive level became that of tactics, and not of operational art. However, the assiduous work to restore tactical manoeuvre was not accompanied by parallel efforts to maintain operational manoeuvre, so when a breakthrough was accomplished, attempts at exploitation faltered rapidly.¹³⁴ When robust and reliable armoured and cross country vehicles restored mobility, the decisive

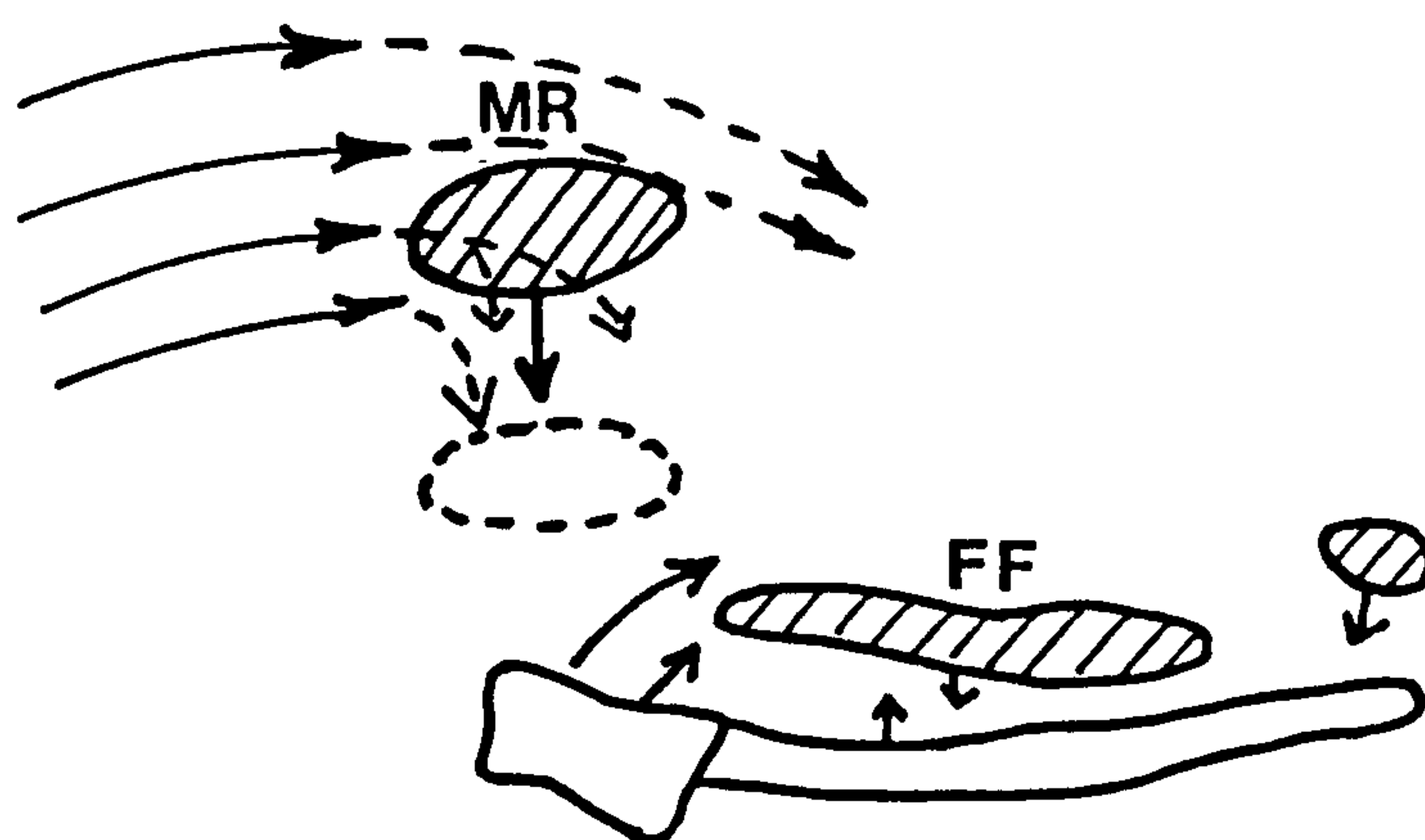
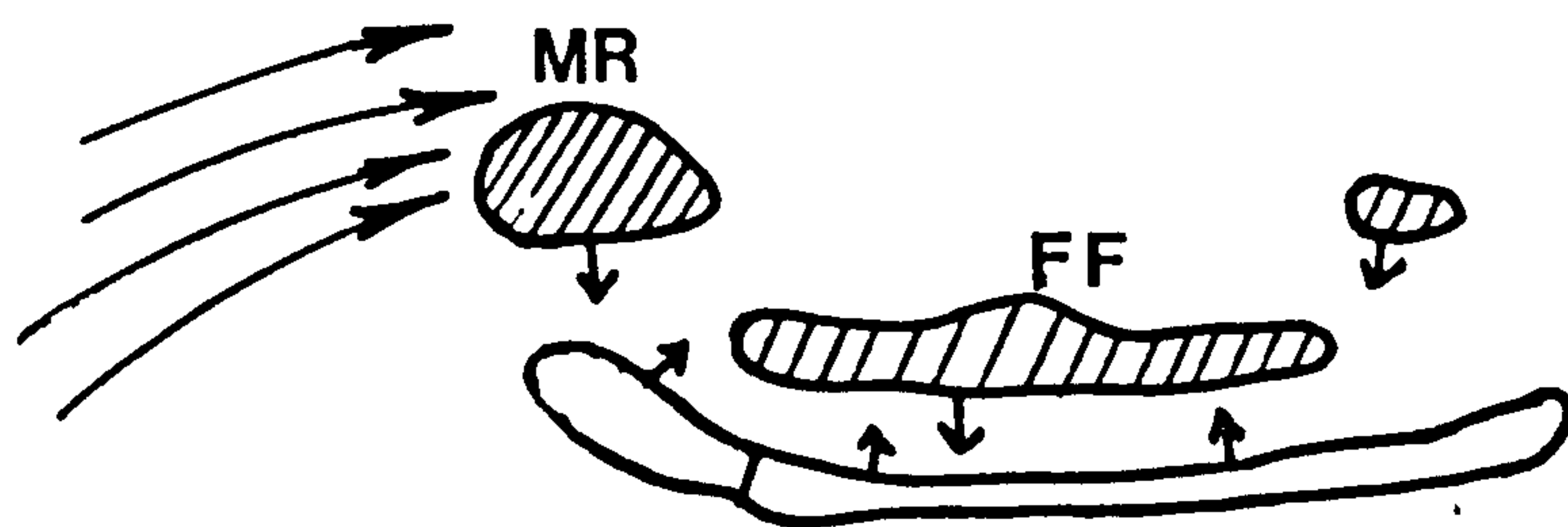


Figure 3.3. Operational level envelopment (Neznamov)
 FF = fortified front
 MR = mobile reserve

level once again became the operational.

Returning to 1912, Neznamov still envisaged the possibility of envelopment. Neznamov's illustration of his grandiose but simplified vision of the operational battle is reproduced in figure 3.3. This involved strengthening one flank of the forces engaging the enemy main line, in order to draw in the enemy's mobile reserve, and then a wide outflanking movement by the attacker's manoeuvre force. Even if the defender's mobile reserve was not completely sucked into battle, this would at least shorten the distance which the enveloping force had to cover.¹³⁵

Neznamov's War Plan, published in 1913, contains many kernels of truth on which the Soviet view of future war would expand. The main part of the work begins with a quotation from the German, Bernhardi, also author of a work on Future War, embodying the need for a cerebral approach and foresight:

'War is not only a clash of material and moral forces, but also of mental (umstvennye) ones. Apart from the mind's significance for employing material resources (sredstva), a correct evaluation of the situation and foresight, well thought through, will confer an undoubted advantage.'¹³⁶

Neznamov cited Mikhnevich, who began his evaluation of war with a section on the 'character of an impending (predstoyashchaya) war', and then began his own section on the 'character of the war'.¹³⁷ All military preparations were directed towards one aim: 'to guarantee victory in a general engagement(v general'nom srazhenii')'.¹³⁸ Only the offensive could defeat, beat down or destroy the enemy: the defensive could only beat him off, and gain time. It was not sufficient to have a general superiority in numbers over the enemy; one had to be able to attain superiority at the decisive place (the frontier) in a given time (not later than the time when the enemy was ready to attack).¹³⁹ Neznamov's fighting talk contained

many of the characteristics of Soviet military thinking since. Turning to specific considerations affecting Russia (which would apply equally to the Soviet Union), Neznamov wrote, with lavish use of italics:

'A state with huge territory, a comparatively weak railway network, a long land frontier and a variegated [multi-national] population, even disregarding questions about the need to deploy forces on several fronts, by its very scale is precluded from completing its mobilisation and deploying forces to the frontier as rapidly as a smaller state, with a homogeneous population.

These states are physically incapable, as it were, of putting forces equal to the enemy's into the field in a given time.

They are thus temporarily not ready for decisive action. They, in the interim (poka), are in no position to do all that they would like to and could do, and for them, once again, temporarily, it is necessary to postpone the decision.

Temporarily weaker in the given circumstances they do not shrink from the offensive: they thirst for it, but, temporarily unready for it, they wait and take measures to merely slow down and limit the enemy's successes.

This state turns to the strategic defence, which must be reviewed, as a continuation of preparation for the decisive battle which has not been completed in peace time. [Neznamov refers to part 1 of his Strategy, 1909].

Thus, for a state, for whom the necessary strength [sredstva bor'ba], is, generally speaking, attainable, military preparations must have one (single) aim - victory in a decisive engagement.

Those, who, through weakness, cannot wage war with the hope of defeating the enemy, either run to allies, or do not proceed from a wide political horizon and take no part in the solution of world issues.'¹⁴⁰

Neznamov concurred with Clausewitz in viewing war as an extension of politics, a view manifested most literally. His apparent contempt for smaller states and his clinical view of large scale warfare as a first division contest in which states chose to engage, or were relegated in humiliating fashion to the sidelines, appears outdated, Darwinian, almost callous. But he was a realist, and the

discussion of the strategic defensive as buying time in order to complete preparations unfinished before the outbreak of war is a vivid description of the 'first period' of the Great Patriotic War. It is also of cardinal interest today, in the light of the Soviet Union's renewed stress on the strategic defensive.

Neznamov's work continued with a section on sily i sredstva: 'forces and equipment', or men and matériel, a modern Soviet term.¹⁴¹ He then addressed the strategic deployment of armies, including the distribution of forces to, and within, different theatres of war, logistics, the role of forces, training and so on.¹⁴²

Military writers like Gershel'man had understood the need to seize political and economic centres as well as destroying the enemy's armed forces. Mikhnevich understood the term 'strategic rear' in the widest sense, embracing the entire country.¹⁴³ Although a view that a future war would be relatively short and fast moving seems to have prevailed in the rest of Europe, Mikhnevich, who was Chief of the Russian General Staff from 1911 and Bliokh, whose work was, as noted, influential, both believed that it might be protracted. Mikhnevich believed that more than one campaign would be required, each of which would comprise several engagements (srazheniya) and smaller battles. First echelon ('first line') armies which were destroyed would be replaced by second echelon armies.¹⁴⁴ Protracted war would, in turn, have more of an effect on the country, a view enunciated by Mikhnevich and another Russian military professional, Gulevich. Modern mass armies and trained reserves would, Gulevich argued, mean that

'we should expect, not the rapid conclusion of a future war with colossal blows on the battlefields but, on the contrary, - a long, bitter and prolonged struggle (dolgaya, upornaya i prodolzhitel'naya bor'ba). And therefore the question of the material resources for waging war for what may be a prolonged period, possessed by each side, now acquires especially

great significance'.¹⁴⁵ .

The Bliokh study had also noted the possible reaction of the nation's populace as a whole. Mass conscript armies and heavy casualties would mean that every family would be involved to some extent. Military disasters would elicit the protests, the groans, of the population as a whole. In addition to the extent of involvement, modern Europeans were 'much more excitable and sensitive' than their forefathers, something even truer today than it was in 1914.¹⁴⁶ The Bliokh study also noted the complex structure of international credit and trade, which was likely to make war impossibly inconvenient. This factor was also analysed by the British pacifist Norman Angell,¹⁴⁷ but the view was not confined to pacifists. The German strategist Schlieffen, the very incarnation of German militarism, had also believed that a prolonged war was impossible, because of nations' dependence on unbroken international trade and the development of industry. 'A strategy of exhaustion is unthinkable', wrote Schlieffen, in his famous study Cannae.¹⁴⁸ Therefore, you had to deliver the knock-out blow quickly. The same views of the character of future war could serve widely differing political and professional purposes.

It was in its appraisal of the 'strategic rear', of the nation's entire war making potential, that the Bliokh study had made its greatest error. An agricultural nation, like Russia, would, it assessed withstand the strain of war better than the more industrialised, urbanized nations. In fact, Russia cracked first.¹⁴⁹ Once again, this was not an opinion peculiar to Bliokh and his team. It was promoted by Gulevich, in his book War and the Economy, published in the same year as the final Bliokh study, 1898. The two works were therefore in preparation concurrently, and Svechin believed that the Bliokh study had 'borrowed' or 'adopted' (zaimstvoval) this erroneous thought' from Gulevich.¹⁵⁰

The effect of a major war on Russian society was predicted more accurately by P N Durnovo, at first an Assistant, then an Acting Minister of the Interior, and finally Minister.¹⁵¹ There was certainly no shortage of men in senior and influential positions who predicted the character and consequences of the coming war with remarkable accuracy. Durnovo had been chief of the Russian State police force (the equivalent of the modern MVD) from 1884 to 1893 and had been responsible for suppressing the 1905 Revolution.¹⁵² The interest of an Interior Ministry official in the likely consequences of a future inter-state war underlines the integrated nature of internal and external security questions, which is of particular importance today (see part 4). Svechin's Strategy, published in 1927, noted Durnovo's views in his section on 'The Plan for Preserving Internal Security'. According to Svechin, Durnovo, had

'come to the completely correct conclusion, that internal political considerations must hold Russia back from the decision to enter war, as the latter could only result in the most extreme movements and in revolution, taking it to its logical conclusion.'¹⁵³

In February 1914 Durnovo presented a report to the Tsar discussing Russia's international position. The addition of Britain to the Franco-Russian alliance had, he believed, been a mistake. Allied only with France, Russia could remain on friendly terms with Germany, but the addition of Britain would turn Germany violently against her. Durnovo believed that Germany would now prefer to take the initiative and engage in war at the most favourable moment, before Russia's armed forces had been fully reorganized and re-equipped. That moment had now come.¹⁵⁴ This provides some support for Norman Stone's thesis that Germany had to go to war in 1914, before Russia's military reforms were completed and effective in about 1917.¹⁵⁵ Svechin would have agreed. He assessed that Russia had been well prepared for the Great War

diplomatically but was unready militarily and in terms of its internal political situation. 'What is remarkable is not that we had a Revolution in 1917, but that it was postponed two years'.¹⁵⁶

Later events fully justified Durnovo's predictions. Italy and Rumania would at first remain neutral, and later join the allies, whilst Turkey and Bulgaria would join Germany. No matter who won the war, Durnovo predicted that the immediate result would be social revolution in Germany and Russia, beginning in the country on the losing side and spreading to the victor.

Durnovo's predictions extended to the military-technical character of the impending war. The Russian army was short of ammunition, and (although her field artillery was excellent), she was deficient in large-calibre guns. The last prediction was remarkable since even the French did not realise the significance of heavy artillery until after the onset of trench warfare. He believed that a war between the world's most advanced industrial states would produce a number of new weapons, but that Russia would find it hard to compete in this field. In fact, the performance of Russia's war industry was remarkable, but that effort brought its own consequences in 1917. Durnovo's predictions contained only one error. He believed that Britain would never countenance the complete destruction of Germany as a world power, but merely strive to annihilate her fleet and deprive her of colonies. Perhaps if they had taken Durnovo's advice, there would have been no Treaty of Versailles, no Nazi party, and no Hitler.¹⁵⁷

This section has demonstrated that the view of the likely character of a future war within the Russian army, disseminated through authoritative military journals, and at General Staff and Ministerial level, was remarkably accurate in many respects. The Bliokh study, itself based almost entirely on professional military analysis, had

also been widely read and assimilated.

In addition to the formidable legacy of Imperial Russian thought and writing on the subject, the views of three men outside the Russian establishment would also influence Soviet views on and approaches to future war. These were Marx, Engels and Lenin.

In terms of the military-technical aspects, Engels is the most important. Engels was a highly expert analyst of military affairs: Marx considered that he had 'made the study of military questions his speciality'.¹⁵⁸ Many of the articles attributed to Marx owe much to Engels' expertise. The division of interest was fairly clear cut, as modern Soviet analysts admit: Marx was more interested in 'the [political] essence of wars and their character': Engels in 'the material basis of military affairs, the nature and origins of wars and armies...'.¹⁵⁹

The image of a decline in military art corresponding to the rise of technology, enunciated by Martynov in the 1890s, was at one with the view expressed in an article, attributed to Marx, published 40 years before, at the time of the siege of Sevastopol.

'That siege is a striking proof of the fact that in the same proportion as the materiel of warfare has by industrial progress advanced during the long peace, in the same proportion has the art of war degenerated. A Napoleon, on seeing the batteries before Sevastopol, bristling with eight and ten inch guns, would burst out in a fit of irresistible laughter'.¹⁶⁰

Engels recognised that future wars between major powers would be total wars, and would depend to an unprecedented degree on technology, which in turn depended on a nation's industrial base. Writing of Germany, his views could be applied equally to Russia, and were taken to heart by the Soviet General Staff, after the first such war.

'And finally, no war is any longer possible for Prussia-Germany except a world war, and a war of an extension and violence hitherto undreamt of!'.¹⁶¹

An alternative translation might describe a war of 'unprecedented scope, unprecedented force', and this is

appears to be what the Soviet General Staff are still planning for today (see part 4). Engels also noted the effect of technology, describing the very latest innovations in 1892:

'From the moment warfare became a branch of the grande industrie (ironclad ships, rifled artillery, quickfiring and repeating cannons [machine guns?], repeating rifles, steel covered bullets, smokeless powder, etc.), la grande industrie, without which all these things cannot be made, became a political necessity.¹⁶²

The enforced industrialisation of the Soviet Union in the 1930s certainly owed much to strategic requirements, and therefore conformed to Engels' views very precisely.

Nevertheless, it is Marx and Engels' stress on the link 'between politics and war, the army and politics'¹⁶³ which receives most attention. First, they stressed the preeminence of political considerations: 'diplomacy is higher than strategy, '(Engels).¹⁶⁴ Secondly, they recognized that warfare has its own grammar, its own impetus, its own momentum, but that if this runs counter to political conditions the results can be harmful. Thirdly, modern, mass warfare has a profound influence on society as a whole (as Bliokh and the professional military analysts also stressed). Fourthly, and conversely, society would have an influence on the conduct of warfare, both by its own forces and with respect to the character of the war as a whole. For example, they predicted 'an increase in the counter-revolutionary direction of bourgeois armies in future bourgeois wars'.¹⁶⁵ In fact, in Russia some elements of the army provided the vanguard of the revolutions. One wonders what Marx and Engels would have made of the role of the Romanian Army in the 1989 anti-communist 'revolution', fulfilling the letter of their prediction, if not the spirit. In Germany and Britain (Ireland) after World War I large groups within the military did arguably side with

'counter-revolutionary' interests. In Russia, some did: others rallied to the new government.

Before his arrival in power in the Soviet Union, Lenin cannot be said to have produced much comment on the military-technical character of future war. He certainly recognised the importance of military nuts and bolts, but left tinkering with them to others at this stage. In 1905, he acknowledged that

'No Social Democrat at all familiar with history... has ever doubted the tremendous importance of military knowledge, of military technique, of military organization as an instrument which the masses of people, and classes of the people, use in resolving great, historical conflicts.'¹⁶⁶

However, Lenin's early writing is concerned with the political characterization of wars, whether they are 'just' or 'unjust'.¹⁶⁷ In 1915 he devised a typology with three possible scenarios. Wars between oppressor and the oppressed were just for the oppressed and unjust for the oppressor. Whether the war was offensive or defensive in the military-technical sense, he considered unimportant. The second case was two oppressor nations (Rome and Carthage, Britain and Germany in World War I). The third was 'a much more complicated question': a system of nations with equal rights, as in Europe before World War I.¹⁶⁸ Lenin's views on predvideniye are, however, more relevant to this thesis. He particularly valued Engels' prognosis for a future world war, particularly its outcome.¹⁶⁹ In commenting on Lenin's views, Dr E A Rybkin noted that

'Of the three most important components in foreseeing (predvideniye) future wars (their social character, causes and consequences), the first is by far the simplest since the character of the war itself, its political aims and nature coalesce, are created, from the essence of the politics of the given state (or group of nations), long before the war.'¹⁷⁰

Once Lenin found himself in power, at the head of a

state fighting a war for survival, he became much more involved in military-technical questions, addressed in the section below, covering the Soviet period and the period after World War I.¹⁷¹ After the Revolution and Civil war, the writing of Marx, Engels and Lenin on future war and military art were codified and fused with the former main stream of military writing. In this context, the 1927 volume War and Military art in the Light of Historical Materialism is highly significant. In addition to articles by military thinkers including Svechin and Tukhachevskiy, it featured appendices on Marx, Engels and Lenin's thinking. Published ten years after the Revolution and seven after the end of the main struggle of the Civil War, this work is one of the first to codify and merge Marx, Engels and Lenin with the Russian tradition of military thinking.¹⁷²

Returning to the apparatus in power in Russia before 1914, a study of Russian views of future war suggests that the character of World War I was foretold very accurately. Interior Minister Durnovo and Chief of the General Staff Mikhnevich had both produced remarkable descriptions of what it would be like. The perilous position of Poland was well understood: it was a salient that could provide a decisive advantage if Russia launched her attack first: a liability and trap if her enemies did so. This, plus the need to assist her French ally, forced the Russians to attack early, resulting in accusations of impetuosity.¹⁷³ The Russian General Staff had also correctly predicted the constricting effect of reliance on railways, and the consequent need for armies to roll off their trains and into battle at the right angle and in the right direction. The decisive importance of the railway asserted itself early, as Hindenburg used the superior East Prussian rail network to move forces to destroy the Russian second Army under Samsonov and then move them north again to push back the First army, under Rennenkampf.¹⁷⁴

In terms of the 'battle picture', the kartina boya, the Russians had produced a fairly accurate sketch. The extended battlefield, breaking up into a series of engagements linked by a common aim, had been accurately predicted. A group of young staff officers at the General Staff Academy had been wrestling with the emerging concept of the operational level of war just before World war I.¹⁷⁵ At this stage, large scale manoeuvre was still possible. In the east, unlike the west, stasis seems to have occurred from late 1915 not because of a lack of elbow-room, but more because of exhaustion and supply problems.¹⁷⁶

The one area where the pre-war vision was not fully implemented or vindicated appears to have been the strategic use of cavalry. Although Russia had superior cavalry forces to the enemy, she did not employ them to conduct an aggressive, deep penetrating pre-emptive and dislocating raid, as all the literature from the end of the previous century might have suggested. Plans for such a raid, from the Middle Vistula into East Prussia existed.¹⁷⁷ Such a raid was also, interestingly, predicted by H G Wells, at the outbreak of war, in September 1914.¹⁷⁸ Had it taken place, it could conceivably have dislocated the rail system and made Hindenburg's rapid switch of forces, using the advantage of interior lines, impossible. But according to General Yuri Danilov, German superiority in air reconnaissance, armoured cars, telephone and telegraph networks would have made it easy to detect and counter. The Russian cavalry also had many other missions to perform. Finally, the experience of Mishchenko's deep raid in the Russo-Japanese War did not bode well for such operations.¹⁷⁹ There were, however, some more limited actions by Russian cavalry on the 'left' (west) bank of the Vistula.¹⁸⁰

The final word on the Russian view of the future war which finally broke out in 1914 lies with the Chief of the

General Staff from 1911, Mikhnevich. His definitive work Strategy stressed that

'military matters progress under the influence, in the main, of improvements in technology/ technique (tekhniki)...The sophistication and number of fighting machines, skilfully controlled (iskusno upravlyayemykh)- will be the main factor in determining the outcome of the struggle [in a future war]'.¹⁸¹

In 1898, in analysing the impact of 'armies of millions', he concluded:

'Future wars will therefore lead to more weighty (boleye krupnym) results and, of course, will have more serious historical consequences.'¹⁸²

In the broader sense, the Russian General Staff before World War I therefore appear to have got their vision of future war about right.

2. MECHANIZED HORDES. THE ROAD TO WORLD WAR II

'Now, when the reconstruction of Russia's [The RSFSR's] armed forces is beginning, it is necessary to give oneself an account of the character of contemporary war, without which individual questions relating to the structure of the army cannot be resolved correctly. The present war has still not finished and it is impossible to sum up the total of these grandiose events but, from the haemorrhage of four years of war and leaning on the experience of the Russo-Japanese War of 1904-1905, which has been studied, it is already possible to set down certain characteristic peculiarities of contemporary war ...

Thus, a modern great war is characterised by the alternation of manoeuvre and positional war in time and space...

Therefore in future it is necessary to put all efforts into achieving success in the manoeuvre war, realising the unavoidability of utilising positional warfare on individual sectors during the period of manoeuvre warfare, and also the possibility of the whole front going over to positional warfare, when manoeuvre fails to achieve decisive results.'¹⁸³

This was written in the confused Soviet Russia of 1918, as the build-up of the new Red Army began. The author,

Aleksey Gutor (1868-1938), had been a front commander in the Imperial Army and member of the Stavka.¹⁸⁴ This very senior Tsarist officer wrote for the benefit of the new Soviet Army with a clarity and insight befitting his rank. Besides its elegant presentation of many of the issues and terms cardinal to this thesis, this article also illustrates the fact that predicting the character of a future war had begun before the 'present' (nastoyashchaya) Great War had finished. Gutor paid great attention to the Russo-Japanese War, pointing out that it was the prolonged stalemate along the river Shah-Ho that had first received the designation 'positional warfare'.¹⁸⁵

For Gutor, the lessons of the Russo-Japanese War were perhaps clearer than those of the unfinished Great War, but even after 1918 the Russo-Japanese and Balkan (1912-13) wars were analysed assiduously. With hindsight, it is tempting to think that they were completely overshadowed by World War I, but this is not the case. It would take time to analyse the huge database formed by World War I. Neznamov published an extensive analysis of the 'Lessons of the Great War' in Voyennoye delo during 1920, but his Contemporary Warfare, published in 1921, was a revision of work completed before the Great War. The second part, for example, incorporates his War Plan of 1913, virtually unchanged. The Russo-Japanese, Italo-Turkish and Balkan Wars still feature prominently;¹⁸⁶ a short paragraph, or even a part of a sentence is added where World War I offers an example of an idea previously expressed;¹⁸⁷ a footnote is added or expanded citing the invasion of Belgium or the tentative possibility of delivering troops' most important equipment by air.¹⁸⁸

Gutor's stress on the need to make every effort during the manoeuvre period contained reflected the desperate need to prevent formation of a continuous front, which would mean the dreadful, bloody, costly stalemate of World War I. This could only be achieved by keeping the enemy off

balance from the beginning of the conflict, keeping on the move. The Civil War bore out Gutor's prediction of a mixture of manoeuvre and positional warfare. The relatively small numbers of men and the extent of the terrain resulted in a revived ability to manoeuvre, but sometimes, as with the attack on Perekop, on the isthmus leading to the Crimea in 1920, circumstances dictated a return to World War I models.¹⁸⁹ It is necessary to consider the lessons of the First World and Civil Wars together, as those serving the new Soviet regime did in the explosion of analysis which followed the conclusion of the main operations of the Civil War at the end of 1920.¹⁹⁰ Until then, in spite of the odd outstanding article, Bolsheviks and former Imperial officers alike were primarily concerned with winning the 'present' war.

Despite some assertions that the Civil War represented an advance in military technique, for example the use of armoured trains to facilitate 'march-manoevre' operations, deploying from lines of march along railway lines,¹⁹¹ and 'armoured cavalry' as the principal arm,¹⁹² others realised that the western front in World War I offered more lessons for a highly scientific and technological conflict, and that

'in view of the development and superiority of technical weaponry in the west, that it [the European War of 1914-18] will, perhaps, influence preparations [for a future war] to a greater extent than will our experience in the Civil War.'¹⁹³

In the immediate aftermath of World War I Soviet writers noted the growth of 'machine warfare', the best translation of mashinizm, for 'mechanization' refers specifically to the large scale introduction of cross-country vehicles. Mashinizm referred to the all the expensive and specialised machinery of positional war, particularly artillery, and not to the motorisation and mechanization which still lay in the future. They noted

it with a sense of inferiority and great concern, because, if the Imperial economy had been the least equipped to cope with the demands of machine warfare, their own shattered economy was even less so.¹⁹⁴

It is perhaps ironic that positional warfare resulted in enormous advances in artillery survey and predicted fire techniques, mapping, air reconnaissance, and consequently air warfare in general including strategic bombing and putative airborne forces, chemical warfare, long range artillery, combined arms tactics down to battalion level, automatic weapons, the development of the tank (although armoured cars were deployed on the eastern front at the outbreak of war), and in motor transport to move and supply forces.¹⁹⁵ Had World War I been short and retained a manoeuvre character, the armies might have finished it as they began, rifle armed hordes with quick firing field guns, large cavalry forces and a few primitive aircraft. The former was the state of warfare in the west in 1918, the latter, broadly, that of warfare in the east in 1920.

From the Soviet Russian viewpoint, there were three aspects of World War I which must not be repeated. The first, as noted, was a positional war of attrition. The second was Imperial Russia's economic and industrial weakness, a repeat of which would be even more disastrous as Soviet Russia was isolated by a ring of actually or potentially hostile states with superior technology and wealth. Soviet Russia was deliberately excluded from the 1921 Washington Conference on the Pacific: Britain, France, Italy and China all delayed recognition of the Soviet Government until 1924 and the United States refused it completely.¹⁹⁶

The third realisation was that a unified military doctrine was needed. Gareyev recently opined that 'as a certain system of military views, it did exist in one form or another', in the Imperial Army, while Frunze himself

pointed out that 'doctrine, though unformulated still existed in the Tsarist Army'.¹⁹⁷ A debate on the need for a unified doctrine had begun just before World War I, involving leading Imperial army minds who would continue to serve the Red Army, including A Zayonchkovskiy, Neznamov and Svechin.¹⁹⁸ Nevertheless, there was no state accepted system of views, no 'aggregate of practical procedures recognised as best under present day conditions'.¹⁹⁹

This discussion resumed after the Great War, and unfolded in the pages of Voyennoye delo during 1920. Svechin picked up the debate where it had been left in 1914.

'In the area of military thought in Russia intellectual anarchy rules. A radical change in the programmes for theoretical military training is essential, chasing the elementary, purely abstract, speculative part out of strategy and tactics, restructuring these sciences into a theory of military art, shifting the centre of gravity to military history, and weakening [emphasis on] mathematical training and sketching in the Academy'.²⁰⁰

It was in this context that Frunze, the man today regarded as the founder of the Red Army and of Soviet military thinking, emerges, temporarily, as the most important future war thinker. Frunze had studied military history and theory exhaustively, and after 1917 combined this with practice, emerging as a highly successful Civil War commander.²⁰¹ In July 1921 he published a highly influential, indeed, historic tract entitled 'A Unified Military Doctrine and the Red Army'.²⁰² Frunze set out the definition of Military Doctrine which remained in force until the mid-1980s, although his words were broad enough to embrace the redefined Military Doctrine (see parts 2 and 4) also:

'A unified military doctrine comprises the teachings adopted in the army of a given state, establishing the nature of the organizational development of the country's armed forces, the

methods of training forces, and leading them on the basis of views prevailing in the country on the character of the missions lying before them and the means of fulfilling them, flowing from the class essence of the state and determined by the level of development of the country's productive forces'.²⁰³

Frunze's demand for a unified military doctrine was hotly contested by the other founding father of the Red Army, who until recently has not been acknowledged in the Soviet Union, Trotsky. Trotsky argued that imposing a rigid framework on military thought and planning would cramp it, preventing a quick reappraisal of a changing situation.²⁰⁴ Trotsky was cited in an article, also critical of Frunze, in Military Herald in 1921, which cited a variety of opinions on the question. Frunze's view of a future great war was even challenged. Frunze had suggested the study of

'...our possible future theatres of war... and the question of the character of a future war against us itself. There are many serious grounds for suggesting that with the correct policies, Workers' and Peasants' Russia can scarcely conceive the possibility of big, mass armies being mobilised against us. Of course, in this regard the relationship of Japan may, for example, turn out to be in a more favourable situation than, for example, Germany. But it is clear, that this question requires our serious attention, given that the preparation of our armed forces depends on the correctness of its solution to a large degree. Comrade Frunze's suggestion that working out the idea of a 'little war' should be made one of the missions of our General Staff Academy requires exceptional attention. But, moving forward, I must mention, that in the meantime the chair of the Civil War at the Academy is still vacant'.²⁰⁵

It is just conceivable that the author was being sarcastic, but given that Frunze's belief in the big war as the overriding model was well known, it could hardly have served a useful purpose. Nevertheless, the fact that Frunze realised the need to study 'small wars' as a

specialised area is of interest: his views on the future great war appear, however, to have become so entrenched in Soviet military thinking that the other options which he recognised as important were discarded. This is a rare reference to specific study of 'small wars' within the General Staff. Although the situation of Russia's contiguous neighbours in 1921 did not suggest the immediate threat of a large-scale continental war, their recovery and Russia's continued isolation during the 1920s made that possibility grow ever larger. In 1928, the small states on Russia's western borders plus Poland actually fielded combined armed forces qualitatively superior to the Red Army, a fact noted in a book called The Threat of War and the Western Neighbours.²⁰⁶

Frunze also established the dialectical relationship - the 'dialectical unity' between the 'technical' or, as he later called it 'military-technical' side of doctrine, and the political (see part 2, figure 2.2).²⁰⁷ He paid attention to scientific and technological advances, writing in 1921 that,

'The outcome of future clashes now depends to a much greater degree on people working in the area of pure science (chistoy nauki) than upon the command. Any invention (izobreteniya) or discovery (otkrytiye) in the area of military technology can immediately create colossal advantages for the litigants...'²⁰⁸

Frunze shared the widespread Soviet concern about the growing role of mashinizm in war. He therefore realised that, in addition to the level of scientific development, 'the country's productive forces' would be crucial in any future war. He enunciated his views in another key article, 'Front and Rear in Future War', in 1924.²⁰⁹ This set out the blueprint for Soviet total war preparations, preparations for a war, as Engels had envisaged, of unprecedented scope, unprecedented force. Because the most up-to-date weapons might be rendered obsolete overnight, it was doubly necessary to pay more attention

to the development of industry and the economy in general, a particular lesson from Russia's experience in World War I. World War I had also suggested that it would not be possible to win any war with a lightning, knockout blow. Wars would take on the character 'of a long and fierce conflict'. Thus, the bond between the fighting front and the industrial rear would become closer,

'The development of military technology and the improvement of means of destruction are another factor acting in the same direction. The conversion of aviation into a decisive military force, the improvement of means of chemical warfare, the possible use of germs,²¹⁰ and so on, all upset the concept of 'front' and 'rear' in their former sense...'²¹¹

Preparations for war could no longer be the exclusive preserve of the War Ministry. Tractors and carts, necessary for the development of the shambolic civilian economy, should also meet military requirements. Military knowledge, including rifle shooting and chemical defence drills, should be disseminated throughout the population.²¹² Frunze demanded little short of total militarization of the state and the economy. In June, 1925, a few months before his untimely and suspicious death his plan became law. The text of the law paralleled Frunze's demands closely. 'Past experience in the imperialist World war and in our Civil War' had shown that 'contemporary war is waged not by armed forces alone, but by the entire country'.²¹³ Particular attention was paid to the dramatic increase in the importance of air forces, and to the need to develop both military and civilian air fleets in parallel.

Thus, by the time of Frunze's death, the foundations for the conduct of a future war of unprecedented scope, unprecedented force, had been laid. Fifteen years later, after the forced industrialization of the 1930s, most of Frunze's proposals had been adopted. During that period, the Soviet Union had perceived itself encircled by hostile

capitalist states, and the future war for which preparations were made was against a 'capitalist coalition'.²¹⁴ It is in this context that the more detailed considerations of the military-technical character of future war were examined.

The 1920s also featured some unusual but remarkable fictional views of future war, and weapons. The 'mashinizatsiya' of war('machine warfare'),²¹⁵ the simultaneous emphasis on chemical warfare and continued widespread use of horsed cavalry create an odd impression of a possible 'future war'. It takes a literary figure - Bulgakov - to encapsulate its essence, in The Fatal Eggs, written in 1924 and set in the close future of 1928.²¹⁶ The Red Army moves through Moscow en route to battle with mutant reptiles:

'Now and then, interrupting the columns of horsemen with their uncovered faces came strange mounted figures in strange hooded helmets, with hoses flung over their shoulders and cylinders fastened to straps across their backs. Behind them crept huge tank trucks, with longer sleeves and hoses, like fire engines, and heavy pavement crushing caterpillar tanks, hermetically sealed and their narrow firing slits gleaming. Also interrupting the mounted columns were cars which rolled along solidly encased in grey armour with the same kind of tubes protruding and with white skulls painted on their sides inscribed "gas" and "goodchem"'.²¹⁷

Bulgakov had clearly assimilated the gist of evidence about the character of future war available to the educated public in the mid 1920s. The emphasis on cavalry is attested by official reports and plans of the time: According to the mobilisation plan for Leningrad factories and works of November, 1928, 25 percent of the capacity of the Vannovskiy metal works, normally devoted to railway production, would be devoted in wartime to repairing swords, bayonets and lances. 30 percent of the capacity of the Sherepovets mechanical shoe works would be turned over to straps, saddles and military leather goods and 20

percent to harness.²¹⁸

The story is illuminating in many ways: lenses for the ray which causes the mutation are imported from Germany and special glass from Königsberg, reflecting Russian respect for German engineering and dependence on German technical know-how during this period. It also contains a chilling prophecy: just as the reptiles have all but surrounded Moscow, they are killed by a sudden frost. The similarity with the events of the Battle of Moscow, in December, 1941, is striking.

Aleksey Tolstoy's science-fiction novel Engineer Garin's Hyperboloid (Death-Ray) was published in the mid-1920s. It was set in the very recent past, as Leningrad (renamed 1924) is referred to as Petrograd. Tolstoy was an astute observer of the latest scientific and technological developments, and was part of the intense intellectual life of the city in the 1920s. 'In that monstrous and titanic decade, the amazing minds of scientists gleamed here and there like torches.'²¹⁹ Tolstoy accurately described the structure and potential power of the atom.

'The principle by which an atom can be forcibly disintegrated ought to be very simple... We are getting very close to the heart of the atom, to its nucleus. In that nucleus lies the whole secret of power over matter. The future of mankind depends on whether or not we can master the atomic nucleus, a tiny fragment of material energy one hundred billionth of a centimetre in size'.²²⁰

Using heated carbon as a compact source of radiant energy, and two hyperbolic mirrors, one made of a fictitious material called shamonite, Garin was able to construct a device essentially the same as a laser (see part 4). It was capable of producing a ray cord powerful enough to cut through a railway bridge in a few seconds.²²¹

'Do you realise what possibilities this offers? There is nothing in the whole world that can stand up against the power of the ray... Buildings, fortresses, dreadnoughts, airships, rocks, the earth's crust... my ray will pierce, and cut

through and destroy everything.'²²²
Garin's ambition leads him into conflict with the Americans, whose fleet attacks his island refuge in a denouement worthy of a James Bond story. With the hyperboloid, Garin takes on the American fleet as it bombards the island.

'A dull, expanding sound came from the sea. like a bubble bursting in the sky. Rolling adjusted the pince-nez on his perspiring nose and looked towards the squadron. There floated three mushrooms of yellowish-white smoke. To the left of them ragged clouds welled up, turned blood red and grew into a fourth mushroom. The fourth peal of thunder rolled to wards the island...he stood there...and watched the mushrooms grow on the horizon as one after the other the eight warships of the American squadron were blown into the air'.²²³

The image of a revolutionary weapon rendering a whole array of conventional systems powerless is popular in science fiction, from Jules Verne and Wells' War of the Worlds onwards. Military history in fact provides few examples of a new weapon conferring such a dramatic advantage but the use of the atomic bomb in 1945, also foreseen by Tolstoy, is one. Tolstoy's instinct that the new weapon might be deployed in a static location and be particularly useful against naval targets is also of interest in the context of modern beam weapons.

While fiction peered far into the technological future, the lessons of World War I and the inexorable expansion of the battlefield preoccupied Red Army thinkers. The breaking up of the battlefield into a number of distinct engagements, with battles both protracted and extended, was probably the most significant feature leading to the formal recognition of the operational level of war.

Whereas pre-industrial armies, by and large, manoeuvred strategically to a tactical fight, prolonged operations over vast frontages involved the manipulation of large forces in linked activities. Such actions could

not be described as strategic, as they were aimed only at contributing to the defeat of a portion of the enemy's forces, but it would be absurd to call these large and prolonged operations 'tactics'. The evolution or assertion of this third level of war was, as noted above, one of the problems with which the Russian 'future war' thinkers were wrestling immediately before World War I. It became manifestly obvious during that war and the German General Staff began to adopt the term operativ to describe this level.²²⁴

Not all Soviet authorities agreed. The involvement of societies' total war-making capacity and the conduct of coalition war arguably meant that 'strategy' had also taken on a new and higher meaning. This 'super strategy' was aimed at the opponent's entire society and economy, and at the fabric of alliances. The most famous (or notorious) of the Soviet Military minds of this period, Mikhail Tukhachevskiy (1893-1937) therefore suggested a division of three levels: tactics, strategy and polemostrategiya - 'war strategy', 'higher' or 'grand strategy'.²²⁵ Such a division might be appropriate in the case of strategic manoeuvres crowned by decisive, pitched battles, as Tukhachevskiy himself had attempted in the Battle of Warsaw in 1920, but was less appropriate for a future war which, it was widely believed, would feature prolonged, continuous engagements like those of World War I.

It was the former Tsarist Major General A A Svechin (1878-1938) who most eloquently encapsulated the essence of the operational level as a function of the expansion of military action in space and time for the Russians, in his Strategy (1926, 1927). Svechin was instrumental in getting the term adopted by the Red Army from the late 1920s. His definition of the operation indicates a clear line of descent from Mikhnevich and Neznamov:

'Tactical creativity, in its turn, is regulated by operational art. Military action is not something decisive in itself, but only the raw material from which an operation is assembled. Only in very rare cases can one count on achieving the decisive aim of military action by one act. Normally this route to the final aim extends over a number of operations: the latter are separated in time by more or less significant pauses, extend over separate parts of the territory of the theatre of war, and are especially sharply distinguished on account of differing intermediate aims, to attain which the efforts of the forces are temporarily directed. We call an act of war, in the course of which forces are directed in a defined region of a theatre of war towards the attainment of an established intermediate objective without any break, an operation. An operation is a conglomeration of very different activities...'226

The Soviet Military Encyclopedia dates the adoption of the present division of military art from the 'late 1920s'.227 As figure 2.2 showed, Strategy is the highest level of military art, involving 'the theory and practice of preparing the armed forces for war, planning and conducting war and strategic operations using [different] armed services'. Operational art (operativnoye iskusstvo) a term until recently unfamiliar to English speakers, involves the conduct of linked or independent operations by higher formations (ob'yedineniya) of the different services. Tactics concerns the conduct of combat(boi) by subunits, units and formations (that is, usually up to and including brigade or division level.228

Svechin's disagreement with Tukhachevskiy on the above issue symbolised a more bitter, almost personal, antipathy. This might be expected between a meticulous, former Tsarist Major-General and a flamboyant former Tsarist Second Lieutenant and precocious Civil War hero fifteen years his junior. The author has published two monographs on Tukhachevskiy's career, character and contribution to Soviet military thought, one of which is included as Appendix G.229 Svechin openly criticised Tukhachevskiy's conduct of the 1920 Warsaw operation,

criticism which was probably justified, and repeated by Isserson in the 1960s, but did nothing to endear him to Tukhachevskiy.²³⁰

Svechin appears to have been an abrasive, intellectually arrogant, though for some time indispensable, individual. Originally an artillery officer, he served in the Russo-Japanese and First World Wars, rising to command a division and then serving as an army Chief-of-Staff. He obviously felt some loyalty to the Soviet régime, but he had no respect for revolutionary jargon and challenged fashionable views. He was a student of Clausewitz, Engels and Lenin, and as the modern Soviet authorities Kokoshin and Lobov have also acknowledged, had a highly eclectic('mnogovariantny') approach.²³¹ In 1924, for example, he published an article called 'Dangerous Illusions', in which he defended the Russian Army's performance in Manchuria, on the grounds that it was merely an advance guard, covering a deployment which continued right up to the conclusion of the armistice.²³² He criticised those who relied on Russia's geographical position and who believed that this would compensate for inferior forces, contrasting this with the situation of Germany which had a 'dreadful (uzhasny) geographical-strategic position but had survived and would only continue to survive through military brilliance and constant readiness.²³³ He disagreed with the view expressed (though maybe sarcastically) by Petrovskiy in 1921 that security could be assured by diplomatic means

'...The most artful and tractable Soviet diplomacy cannot secure us against the tempests of war...Along with the illusion of peace we must throw out our reliance on geography. History has not handicapped us strategically. Our extent obliges us to scatter our energies and organizational ability about, makes it difficult to gather our forces to repel attack; but it protects the richest treasures, deep in our vitals, and to drop our guard on these would be a historic act of treason; they

include the most important political-strategic positions, requiring serious military forces, although [ideally] to preserve neutrality and to prevent our being dragged into war. To believe in peace, when political quarrels are tearing peace apart, when the class struggle has intensified so much, to believe that geography will defend us and rescue us, is to deliberately create an atmosphere where our thinking is poisoned by opium, and to close our eyes to present problems. These illusions are a source of great weakness. They have led us to many defeats. The first step to victory must lie in recognising, that we are not wearing any geographical armour, that our breast is open to a blow, that the enemy is not sleeping, that tomorrow becomes today.' 234

The editors of Military Thought and the Revolution published the article, but warned that it was 'one sided', written from a geographical perspective.²³⁵ Yet Svechin's geographical sense made his predictions of a future war highly astute. In 1926, he concluded that in a future war Germany's first victim would be Poland. He stressed the need to take Strategy into account in the industrial development of the Soviet Union. He recommended concentrating industry in the Urals, as the least vulnerable area in a future war, while criticising further expansion of Leningrad's industry and population.²³⁶

Svechin's views on the strategic defensive have led to a revival of interest in his work in the Soviet Union at the time of writing (see also part 4). Svechin believed that the Red Army would be technologically weak in a future war, a view based, significantly, on his extrapolation from Soviet industrial progress in the late 1920s. In fact, Soviet industrialization proceeded more rapidly than he believed possible, a reminder of the need for predictions of technological and industrial development as a basis for further predictions.

In contrast to many contemporaries, for example, another former member of the Tsarist 'military intelligentsia', A M Zayonchkovskiy, who believed that a

future war should be fought on the other side's territory, Svechin recognized the benefit which could accrue from sacrificing some territory. His understanding of the nature of the defensive concurred with that of Clausewitz, 'time which is allowed to pass unused accumulates to the credit of the defender'.²³⁷ The offensive required the expenditure of huge resources: using natural obstacles and the depth of the theatre, the defender could wear the attacker down. But space was not unlimited: it was an asset and, like any other military asset, or resource, should not just be thrown away, but be used to maximum effect. He criticised those who relied on the freedom conferred by an 'ocean of land'. Modern armies were like 'a giant broom', occupying the entire breadth of the Theatre of Operations (TVD). Furthermore, 'the telegraph, radio, aviation, motor vehicles, all modern technology - are great devourers of space.'²³⁸

However, the well conducted strategic defensive would buy time to launch a devastating and decisive counter-offensive. As Svechin observed,

'The effectiveness of the strategic counter-attack (sic. -kontrataka) in the majority of cases exceeds the initial offensive of the attacker in scale to a significant degree. Have we not seen the fundamental accuracy of these views of Clausewitz underlined during the course of the World war? Was his thinking not fully justified by Foch's strategic counter-attack in July 1918, or the Poles' in August 1920?'²³⁹

These were expounded more fully in Svechin's Strategy. Although some in the Red Army believed that a future war could be won by a series of swift operations, Svechin believed that this 'strategy of annihilation' (sokrusheniye) was not feasible. 'The aims of Strategy become simpler', he wrote, 'if we or the enemy aim to conclude the war with a single, annihilating blow, according to the example of Napoleon or Moltke'.²⁴⁰ In modern conditions the slowing down of operations and the

less decisive character of individual battles, which some late 19th century theorists had predicted, was even more marked. Conflict, including armed conflict, would become more varied in character, more diverse. Svechin emphasized a strategy of exhaustion (izmor). He emphasized that this did not mean that destruction of the enemy's armed forces was no longer the aim of an operation: just that many such operations would be needed. The strategy of exhaustion had military and political aims just as decisive as a strategy of destruction.²⁴¹

War was not, as some had regarded it, a 'medicine for a state's internal illness, but a serious examination of the health of its internal politics'.²⁴² Countries like Britain and the United States, with weak armies in peace time, had taken years to mobilise fully. The general parity between the overall strength of major powers militated against rapid wars of annihilation, and he believed, correctly, that 'in future we will, probably, have wars which are, in the main, prolonged'.²⁴³ His treatment of the effect on the internal workings of the state, all of which, like Mikhnevich, he considered synonymous with the 'rear' forms a grim prophecy of World War II, which bears not a little resemblance to Orwell's Nineteen Eighty-Four.

'The Department of Internal Affairs must have its own mobilisation plan, which must take the steps necessary to maintain firm order in the national territory during the period when huge masses are torn away from their work in the country and proceed to collection points to flesh out the armies, and the population of the towns doubles, to meet the requirements of war industry. The crisis, created by these population movements will be compounded by enemy propaganda, sharpened by the activities of enemies of the existing system, by the hopes, which individual national and class groups will have as the ruling class grows weary under the impositions of war. It is essential to think through the measures necessary to maintain order along lines of communications most thoroughly, to take account of all dubious elements, to combat

desertion, to combat enemy counter-intelligence [sic.- surely intelligence is meant] and propaganda, measures for censorship, and so on, and also, if necessary, to substitute special formations composed of reliable elements for military units leaving for the front, or to strengthen the police... Aviation, the wireless, the need for an unbroken flow of huge masses of troops to the front, supplying them with munitions, home leave from the active army which was previously unknown - all these factors now merge the front and the rear. Success in war is now only possible with a high state of discipline in the rear. Now, the army, like a sensitive seismograph, reacts to the slightest economic, social and political movements in the rear. Maintenance of discipline in the army is based, in the first place, on the awareness of the soldier, on the professional core (kadry) of the army - its command personnel. Maintenance of discipline in the rear - is a matter for the people's cadres, the organs of the civil power'.²⁴⁴

Between them Frunze and Svechin had framed and accurately portrayed the overall character of the USSR's war effort. The USSR was undoubtedly the most militarized economy and society in World War II, even more so than that of Britain.²⁴⁵ Svechin's views on the reliability of national minorities were well taken by Stalin, and are of renewed interest today.

Shortly afterwards, Svechin was subjected to a persecution instigated by Tukhachevskiy, and his views to vicious and jesuitical criticism. This intellectual /casuistical/ crucifixion was conducted with characteristic ingenuity and barbarism: M Tukhachevskiy railed against Svechin's strategic views, K Bocharov against his military-historical views, I Slutskin against his methodology, A Sedyakin against his 'Operational Views', P Suslov on 'The Character of Future War according to Svechin', I Duplitskiy on 'The Role of Naval Forces according to Svechin', I Fendel' on his political views, V Dunayevskiy on his theory of permanent mobilisation.²⁴⁶ Svechin was imprisoned, then released to work again. In 1938 he was arrested. His subsequent fate is the subject of

'contradictory accounts': he may have been executed, or may have died from privations in the GULag.²⁴⁷ His *Strategiya* is a formidably impressive work, which should be translated into English and used, not just as an insight into Soviet military thinking, but as a great work of 20th century military thought in general. It remained in use as the standard work on the subject in the higher military Academies of the Soviet Army through the Great Patriotic War and the post war nuclear and missile revolution, until the appearance of Sokolovskiy's book in the 1960s, and interest in it, as noted, has recently revived in the Soviet Union.²⁴⁸

In spite of the apparent animosity between Tukhachevskiy and Svechin, there can have been little real disagreement on matters of strategy, in its Soviet sense of the higher and overall conduct of war. Svechin's war plan involved mobilising or spying on every aspect of the state. In 1928 Tukhachevskiy had presented a plan in similar spirit for the development of the economy which Stalin and Voroshilov rejected because it would have 'militarised the entire economy'.²⁴⁹ His pamphlet 'Questions of Contemporary Strategy' (1926) had stressed, first of all, the coalition aspects of the Great War, likely to be repeated in a future war, and the fact that in the end the members of the losing coalition had been liquidated, which was consistent with his emphasis on the need for a super-strategy.²⁵⁰ He then turned to the 'Character of (a) future war', a phrase which occurs most frequently during this period. Tukhachevskiy's remarks on the subject were right to the point.

'To answer the question what character will any future war (vsya budushchaya voyna) have is impossible, since, as a result of its development, any war will change its form. its character

and one may not foresee(predugadat') these in advance. For example, in the period of large manoeuvre battles in 1914 and even in 1915, nobody could say what form attack and defence would finally assume by 1918.'

We can predict, foresee the forms of a future war for its first period only, on the basis of the character of the development of armed forces, the preparation and militarization of the industry of countries entering the war, and so on. We can, on the basis of constant study of these basic factors come to a conclusion, give an approximate photograph of the character of the first period of the war. But there is no doubt that the forms of warfare in its subsequent phases will, developing and reacting with each other, change.'²⁵¹

Tukhachevskiy was right about both World Wars, and his remarks highlight the common-sense behind the constant attention to the 'opening period' of a future war (see also part 2).

During the 1920s Tukhachevskiy presided over the official study entitled Future War with Zhigur, Nikonov and Berzin (see part 1).²⁵² The study envisaged a massive, coordinated attack on the Soviet Union by a capitalist coalition, a view which history has proved to be somewhat pessimistic, but which explains the extraordinary efforts made to build up the Soviet economy and war industry during this period, for example, the construction of the colossal Magnitogorsk Metallurgical combine, authorized on 15 January 1929.²⁵³ If this was over-pessimistic, it was balanced by the over-optimism of hoping for revolution and civil war in the capitalist aggressor states. However, these would 'hardly attain large dimensions immediately'. Future War continued by warning that

'Without serious exertion and victories by the Red Army, the demoralization of our opponents cannot attain the dimensions necessary to ensure that the war of the imperialists against the Soviet Union will be converted into civil war, into revolution.'²⁵⁴

Several variants of the possible attack on the Soviet

Union by a coalition of imperialist states were identified.

In 1928, the Red Army Staff divided all the principal nations into four groups: those clearly hostile to the USSR, forming an anti-Soviet front; those which might join this front; those not interested in war with the Soviet union for geographical, economic or political reasons; and those friendly to the USSR. In 1929 the last category would have been very small. Germany, for all its military cooperation, was still a potential enemy: Mongolia was the only real ally.²⁵⁵

The western nations were seen as the most dangerous and in addition to the extremely rapid development of Soviet defences, the doctrines and methods 'of the most probable enemies in the west' were studied. So were the probable theatres of military operations (TVDs), with most stress being placed on the western frontier.

'From this point of view, the course [narezka - literally thread or rifling] of TVD boundaries was established. Calculations about the capacity of strategic and operational directions were done. The strength of higher formations, the breadth of defensive belts and the subsequent offensive, the depth of operations, the length of the war and other operational-strategic and operational-tactical indicators (pokazateli) were drawn up.'²⁵⁶

Tukhachevskiy's views were generally compatible with those of the other major Soviet thinkers of his time. One important issue in the inter-war period was the widespread western view, analogous to the 1890s debate described above, that quality and quantity were incompatible. From the massed machine warfare of 1914-18, mechanization would lead to small, élite, highly trained forces, a view propounded by the British theorist John F C Fuller and by Charles de Gaulle. Verkhovskiy had, it is true, tentatively introduced this idea in the more tolerant 1920s, suggesting that armoured forces, like medieval knights, would form an élite shock force.²⁵⁷ But now

Tukhachevskiy and his contemporaries Triandafillov (1894-1931) and Isserson (1898-196?) continually stressed that mass and mechanization were not incompatible.

Triandafillov actually quoted Svechin on the subject: 'War requires forces of high quality and in sufficient numbers'.²⁵⁸ This was one of the main issues in Tukhachevskiy's preface to the 1931 translation of Fuller's 1923 book The Reformation of War,²⁵⁹ and has been further explored by the author in the published monograph at Appendix H. Another of Tukhachevskiy's colleagues, one of the editors of the unfinished 1933 Soviet Military Encyclopedia, R Eydeman, also dismissed the 'little army' advocated by Fuller in Britain and Seekt in Germany:

'At the basis of this theory lies 'massophobia' (massoboyazn'), fear of the growth of revolutionary fighting, a recognition of the fact that a nation-state, having created mass armies, will be torn apart by class contradictions. The theory of little, fascist-ized (fashizirovannye) armies cannot be regarded as a product of the present day development of military technology, as a new word in military art, but as a product of the dead end in which the capitalist world has put itself. In (a) future war the side which will come out on top will be the side which disposes of masses - masses at the front and masses in the rear. On the basis of the new - on the Soviet model - on the basis of the revolutionary alliance of the proletariat and the working masses in the country a new mass army is being created. This is why the theory of little armies is a theory which does not and will not find any response in our military-scientific thought. Aviation, motor-mechanization, cavalry - this little army is obliged, during the opening period of a war to prepare and guarantee the entry into action of armed masses, which, as before, ensure decisive successes in war and reinforce this success.²⁶⁰

Eydeman had in broad terms forecast the arrangement which the Red Army would adopt during the Great Patriotic War of 1941-45. The ideal of a high quality, high-technology mass army proved impossible to achieve in practice at this stage. Tanks and motor vehicles were still in short supply, as were men with the skills to operate them and

other higher-technology equipment. Therefore, Red Army formations tended to fall into two categories; the élite, mobile formations (tank and mechanized corps and, later, tank armies), plus other élite or semi-élite formations (Reconnaissance formations(OMSBONs),²⁶¹ those designated 'Guards'), on the one hand, and the mass army on the other. The use of armoured spearheads to initiate and accelerate all major offensives from 1942 onwards was a manifestation of the model described by Eydeman.²⁶²

Tukhachevskiy's views on the overall character of a future war are apparent from his 16 July 1930 paper to the Communist Academy (Komakad), which included one of his vicious attacks on Svechin. In fact, he appears to have agreed with, or lifted, many of Svechin's ideas. As in the 1931 preface to Fuller, he dismissed the idea of 'little wars', as he and his colleagues had dismissed the idea of 'little armies'. 'On the contrary', he wrote, 'grandiose wars are inevitable, as long as a large part of the world is not socialist';²⁶³ 'the scale (razmakh) of a future war will be grandiose!'²⁶⁴ Industrial mobilisation had been a notable feature of World War I: 'in a future war, the mobilization of industry will, first of all, take place in a much shorter time than before and, secondly, in this short time industry will produce much more military hardware, than in the past war'.²⁶⁵ He repeated his emphasis on the coalition character of modern wars, and then made a statement which concurs with Svechin almost word-for-word:

'The future (gryadushchaya) world imperialist war will not only be a mechanized (sic.-mekhanizirovannaya) war, during which huge material resources will be used up, but together with this, it will be a war which will embrace multi-million strong masses and the majority of the population of the combatant nations. The frontiers between the front and the rear will be rubbed out (budut stirat'sya) more and more'.²⁶⁶

Svechin's comment that the 'front and rear' would 'merge'

(sblizhaet) was almost identical.²⁶⁷

Tukhachevskiy then made a surprising comment, which led into his prime disagreement with Svechin: what Soviet industry, and industrialization could achieve:

'I would say, that the scale of our military-theoretical thought is lower than the pre-[World] war [One] level. Carrying on the Civil War in conditions of ruined transportation and industry, in conditions where the Civil War fronts tore gaps in our economy, - this has been reflected in the thinking of many of our theoreticians in such a way, that they say that the Red Army will have to fight in future wars on a reduced technological and economic base. Such a proposition goes against the achievements of present day industry and conflicts even more with the Five Year Plan for the development of our economy and the whole General Party Line'.²⁶⁸

Svechin and Verkhovskiy were singled out for criticism as conservative and opportunist, Verkhovskiy suffering especially because of his belief in 'armoured knights' (bronirovannye rytsarey) of the future, while Triandafillov, Nikonov and Zhigur were approved of as 'progressive'.²⁶⁹ Triandafillov's most recent book, The Character of Operations of Contemporary Armies, first published in 1929, won all the prizes. 'An extraordinarily interesting book', enthused Tukhachevskiy, 'reflecting the general line of our party. It is a progressive book, setting out in the widest sense missions for employing our growing technology'.²⁷⁰ There were a few things wrong with it, said Tukhachevskiy, but these 'did not diminish its huge progressive significance'.²⁷¹

Triandafillov had attacked Fuller, Seekt and Verkhovskiy in the section dealing with the 'possible numerical strength of mobilised armies'. The idea that one could 'overcome a modern state with a small, albeit motorized army' was 'naive'.²⁷² Triandafillov made the definitive statement leading to the high technology mass army which would be the Soviet ideal for the next sixty years. Only

at the time of writing has his view been seriously challenged:

'Guaranteeing the best conditions for free manoeuvre, for wide[-ranging] tactical and operational art will be attained not by returning, by going back to the small armies of 'cabinet' wars, but by raising the mobility of modern million-strong armies to the same degree, by improving transport technology (using motor transport, six-wheeled vehicles, wider railway development, etc.) The country, which is forced by political circumstances, out of lack of faith in the masses, to return to small armies of professionals, cannot count on being able to wage a great war'.²⁷³

This view on the necessity for mass and mobility, total rejection of the idea of a professional army, and armed forces, became so deeply ingrained that it was still evident sixty years later, in spite of strong demographic and training arguments in favour of a smaller, professional force. (see part 4).

Triandafillov began his work with a thorough analysis of post World War I weapons developments. Both he and Tukhachevskiy noted the potential of automatic weapons. Tukhachevskiy had noted a 'transfer to automatic fire in place of rifle fire' as a characteristic of the Great War.²⁷⁴ Triandafillov noted the potential of the model 1923 Thompson sub-machine gun (of Chicago gangster fame). Although no army had gone over to automatic rifles in 1929, Triandafillov believed that in a future war 'we should expect partial or complete rearmament of the infantry with automatic weapons'.²⁷⁵ The marked Soviet emphasis on automatic weapons, noted by observers during and after World War II,²⁷⁶ can be traced in part to these two influential officers.

Tukhachevskiy and Triandafillov also concurred on tanks. 'Nobody doubts the powerful tactical significance of tanks in a future war', said Triandafillov.²⁷⁷ Although the caterpillar-tracked tank was originally designed to overcome the mud and barbed wire of the

immediate First World War battlefield, its potential as a weapon of exploitation was quickly recognised. As early as 1916, before tanks had even appeared on the Russian front, a Russian artillery officer guessed at their future role correctly, another example of 'future war' prediction beginning before the previous war had finished.

'We do not know for sure what tank tactics will be like but they will probably not be used individually, but in whole groups at wide intervals. It could be that they will be given the mission, not to stop at forward defences, but to move immediately into the area of reserves, [artillery] batteries, headquarters, road junctions, bridges, etc.'²⁷⁸

Deep penetration by tanks might be countered by anti-aircraft guns, which would already be in place at road junctions, bridges and headquarters. The use of anti-aircraft guns in the anti-tank mode was another accurate 1916 prediction of World War II.

In Triandafillov's view, the inter-war period saw the conversion of the tank from a tactical to an operational asset.

'This tank must participate not only in a comparatively brief attack, to accompany infantry into battle, but also in all phases of pursuit, outside the battlefield. The tank will fulfil these new missions as part of new (motorized) units, based on automobiles. In addition, [tank] builders were given the task of giving the tank such power that, undeterred by artillery fire, it could clear the way for lighter(boleye melkiy) tanks.'²⁷⁹

In 1929, Triandafillov still envisaged tanks cooperating with 'strategic cavalry' in reconnaissance. The likelihood that the light tank would probably usurp cavalry's role underlay Triandafillov's comments, including references to 'mechanical cavalry',²⁸⁰ although he realised that this would not take place in the Red Army just yet. However,

'In such countries as Britain, America and France, a whole range of independent motorized formations (motorized brigades) may be formed in the near future, which may fulfil a significant number of the tasks formerly allocated to strategic cavalry. In less wealthy countries motorized

units will be less widespread. The first stage [in the development] of such formations will be the creation of special motorized detachments in divisions and corps, for tactical reconnaissance missions. The next stage will be motorization of corps, division and army signals units; motorization of whole machine-gun battalions; moving field artillery over to mechanical traction, and so on.²⁸¹

In spite of the tank's high profile and appeal, Triandafillov stated categorically that 'a future war will be conducted in the main by infantry and artillery'.²⁸² He was referring here to war on the ground, for he placed enormous stress on the role of aircraft (see 3.4, below), although 'in east European armies it will play an auxiliary role'.²⁸³ Although tanks and aircraft appeared prominent in the invasion of Poland ten years later, the bulk of the German effort arguably still centred around men and horses.

Triandafillov devoted much attention to chemical weapons, but simple calculations as to the volume of agent required to be effective led him to the conclusion that chemical warfare was only likely in positional warfare, or when a stable front formed for some time.²⁸⁴ Chemical attacks delivered by aircraft were also likely against headquarters and communications. Chemical warfare preparations would need to be so thorough that 'armies and the most important centres could continue normal work even when in a contaminated atmosphere for a long period'.²⁸⁵

Triandafillov's section on 'The operations of contemporary armies' began with careful calculations of the size of the theatre of war and the coverage of modern formations. Of the Soviet Union's 3,000 kilometre western border, 1500 faced Finland; 380 faced Estonia and Latvia; 800 faced Poland and 320 faced Rumania. This attention to spatial criteria is characteristic of the Russian and Soviet approach to future war planning.²⁸⁶ His

consideration of the major, and most likely hostile powers reflected the military-political situation at the end of the 1930s, not that of five or ten years later. His consideration of the foremost air forces led him to list France, Britain, Italy, the USA and Poland.²⁸⁷

Although it contained futuristic elements, Triandafillov's work was securely anchored in contemporary realities. His csection on 'movement to the battlefield', including diuscussion of operational deployment and the meeting operation, contains clear echoes of Mikhnevich and Neznamov, writing twenty years before. The extra space in the east would be of benefit here:

'The wider the front, the smaller the columns into which the march order can be organized, the faster the march-maoeuvre can flow, the easier it is to hide from air observation/less the less inconvenient it will be to spread out for rest periods, the more provisions and especially forage will remain and, consequently, the less will need to be brought up from the rear. Moving on a wide front gives more opportunities to attack (okhvat) or go right round (obkhod) the enemy's flanks.'²⁸⁸

Triandafillov's careful comments about the continued dominance of infantry and artillery presaged the attitude of many German generals as late as 1940.²⁸⁹ Dismissing the small, élite armies advocated in the west as 'naive', Triandafillov retained a necessary grip on common sense.

'The million-strong army is formed from a calculation based on men of average talents and average qualities. The modern mass army cannot count on a complement of one hundred percent heroes'.²⁹⁰

Triandafillov's early death in an air accident leaving Moscow on 12 July 1931 robbed the Soviet Union of one who might have become a still greater military thinker. However, his work was continued by the Chief of Red army Staff A I Yegorov and the Operational Directorate under I P Obysov. Papers entitled Red Army Tactics and Operational Art in a New Era were read in April and May, 1932, and these formed the basis for regulations for the

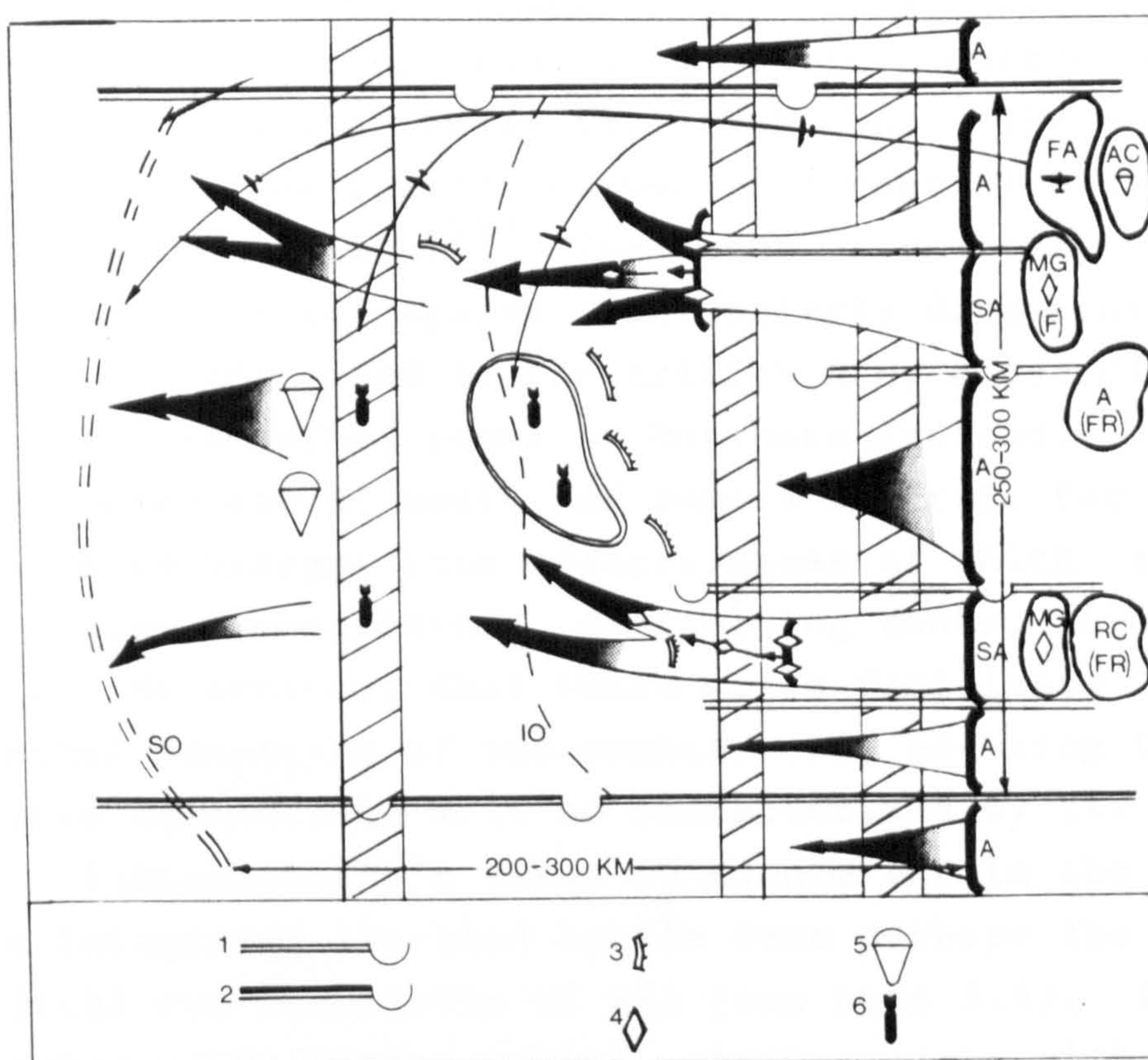
organization of deep battle (see Appendix H), officially approved in February the following year.²⁹¹

Tukhachevskiy was also very aware of the need to consider the human element. In 'New questions of war'(1931-32), he noted the inadequacy of training methods, and that 'the cinema has still, even now, not been properly introduced into training...the use of film, radio and working models must enliven and expand all aspects of field formations' training'.²⁹² Tukhachevskiy loved gadgets, and his creative mind revelled in considering the construction and use of future weapons.

The tank, as noted, had originally been designed with a very specific and limited purpose. Being able to overcome barbed wire and mud if required was not always consistent with fast, economical movement across dry open country or even roads. This created the 'problem of operational mobility on tracks'. Tukhachevskiy believed that this was best overcome using half-tracks - a vehicle with tracks and wheels. Although these were used by the Americans in World War II, they never acquired the dominance which Tukhachevskiy seems to have thought they would. Experience did not bear out his view that 'a tank with a combined wheeled and tracked running gear has the advantage over one with just tracks'.²⁹³ He was right in advocating 'artillery tanks', tanks with a gun of at least 76mm calibre (as fitted to the T-34) which could take on enemy artillery, a massive gun by the standards of tanks of the time and even the tanks used by the Germans at the start of the war.²⁹⁴ He still saw a place for tanks armed only with machine guns, which proved wrong although armoured personnel carriers arguably filled this role.²⁹⁵

Tukhachevskiy also proved correct in stressing that amphibious tanks had an advantage. His view that tanks must share a common chassis with the country's tractor fleet showed great common sense and awareness of economic considerations.²⁹⁶

Figure 3.4. Front offensive operation as envisaged in Soviet Field Service Regulations (PU)-1936



- 1 = Army boundary (Soviet symbol)
- 2 = Front boundary
- 3 = Fortified area
- 4 = Armour
- 5 = Parachute assaults
- 6 = Air attacks

- A = Army
- A(FR) = Army (front reserve)
- AC = airborne corps
- IO = immediate objective
- MG = mobile group
- FA = front subordinated aviation
- RC = reserve corps
- SA = shock army
- SO = subsequent objective

Source: SVE, Vol. 2 (1976), p. 577

Perhaps his most futuristic vision was of the advantages accruing from using remotely controlled tanks, especially against enemy anti-tank guns. These could withstand a far greater number of direct hits without ceasing to function.²⁹⁷ The value of remotely controlled or robot vehicles against particularly dangerous targets has been underlined by the British Army's use of such vehicles to defuze bombs in Northern Ireland. He was a great advocate of radio and remote control, for firing explosive charges (the effectiveness of which the IRA have also demonstrated), controlling tanks, aircraft, and so on. He believed that these would facilitate 'the further deepening of the combat zone, ensuring that the future battlefield will be characterized by its depth'.²⁹⁸

Tukhachevskiy's views on future war in the air and the integrated air-land battle were perhaps the most radical and futuristic of all (see part 3.4). The use of aircraft and 'flying tanks', whether tanks with wings or tanks carried in transport aircraft, were at the heart of Tukhachevskiy's vision of the 'deep operation'.²⁹⁹ Using the opportunities created by the emerging technology of the time, Tukhachevskiy and his colleagues endeavoured to develop the 'consecutive operations' which had evolved during World War I - in effect, a series of hammer blows, into a single, continuous 'deep operation'.³⁰⁰ This concept underlay the 1936 Field service Regulations (PU-36), and recent Soviet analysis has portrayed it graphically, as shown in figure 3.4.³⁰¹ 'Deep battle', confined to the tactical zone - the first 20 kilometres of the enemy dispositions - relied principally on armour and artillery to conduct near simultaneous engagement of enemy forces. This had been described by Triandafillov before his death, 'the possibility of simultaneous attack of the enemy throughout the entire depth of his tactical deployment'.³⁰² The much larger 'deep operation' had to involve considerable air power.

Although many of the most prominent future war thinkers perished in the purges from 1937, Soviet officers went on thinking and writing. G S Isserson, Chief of the Operational Faculty at the Frunze Academy and then Professor of operational art at the General Staff Academy, survived into the 1960s. Isserson noted operations in depth as the key 'characteristic of future war'.³⁰³ This had been the subject of a large report by Yegorov in 1931, then called, somewhat less precisely, The Spatial (prostranstvenny) Operation. Isserson also noted that all this discussion took place at the operational level. 'Questions of military strategy, in terms of the armed struggle on the level of the war as a whole, we could not get involved in'.³⁰⁴

Discussion of the operational meeting engagement and 'March-manoevre' also continued, noting the indecisiveness of the World War I clashes and still drawing examples from the 1904-05 Russo-Japanese and 1912 Balkan wars.³⁰⁵

Yegorov was also a perceptive analyst of more detailed military-technical issues affecting future war. Mobility, he argued in a 1940 article, could depend on the most minute considerations. He advocated the adoption of a calibre of less than 6mm for small arms so as to lighten both the weapon and the ammunition carried. Only relatively recently have NATO and the Warsaw Pact adopted 5.56mm and 5.45mm calibre small arms, respectively. These replaced the 7.62 which was based on the 0.3 inch 'small calibre' rifles introduced with 'smokeless powder' at the end of the nineteenth century. Against the background of the Soviet pioneering work with paratroops in the mid 1930s and their successful employment by the Germans in 1940, he also discussed 'okruzheniye po vertikal'nomy napravleniyu' - 'vertical envelopment', in the context of a 'great contemporary war'.³⁰⁶

Zhukov's operation at Khalkhin-Gol in August 1939

evinced some of the ideas put forward in PU-36, notably the successful use of armour for encirclement. In some ways, Zhukov undoubtedly glimpsed the shape of future war, as it would occur shortly afterwards in France and Poland, and develop in the later Soviet offensives of the Great Patriotic War.³⁰⁷ However, this operation took place almost in isolation, and therefore lacked the crucial quality of the operational level as identified by Svechin, namely that it involved a combination of many different tactical activities, and contributed with other operations to a strategic aim.

The 1939 Soviet Finnish War, though badly handled by the Red Army initially, also revealed some surprisingly futuristic developments on the technological side. Most notable was the employment of recoil-less guns, in which the Soviet Union appears to have led the world at this time.³⁰⁸

From early 1940 the Soviet military press was filled with analysis of their own experience in Finland and of the war in the west. Analysis of the lessons of the Norwegian campaign naturally focussed on sea and air questions (see parts 3.3 and 3.4).³⁰⁹ An anonymous article on 'Artillery in Contemporary war' analysed the breakthrough of the Mannerheim line in great detail, concluding that artillery remained the 'God of contemporary war' much as it had in World War I,³¹⁰ but the quite different lessons of the brief Polish-German war of 1939 were also presented.

'Thus, the basic idea for using tanks involves their penetrating into the depth of the enemy's deployment as rapidly as the conditions allow, deploying there, forming powerful (though sometimes incomplete) mobile groups, which disorganize the system of defence, cut the communications of its main elements, unwind it from within'.³¹¹

It was the Red Army's own PU-36 in action, and clearly recognized as such.

V Melikov's book Strategic Deployment, published in 1940, reflected the continuing preoccupation with the critical opening phases of a war.³¹² The interrelationship of the economy, defensive strength and 'culture', referring to expertise and relevant skills, was continually stressed.³¹³ By 1941, it had become clear that in spite of initial German successes, natural resources, especially oil,³¹⁴ and productive capacity would be critical, as 'military action extended more widely and became more protracted'.³¹⁵

It did not, admittedly, take a genius to recognize that by March 1941 the 'second Imperialist war', as it was still being called, was 'A war of motors and reserves'. Nevertheless, an article with that title identified the link between raw materials, productive capacity and evolving military technology and technique most succinctly. During World War I the mechanical energy per combatant in a front line army had increased from a tenth of a horsepower to between 1.5 and 2. By 1941 the figure was 5 or 6 horsepower per soldier on the ground and if air forces were included, the figure rose to 10: a hundredfold increase since 1914. A 1918 tank had a 6 horsepower engine, a 1940 tank 15 to 20. The Soviet love of figures and percentage increases brought a fresh perspective to analysis of the character of the foreign war which was soon to embrace the Soviet Union.³¹⁶

Another striking aspect of the Soviet analysis is the attention paid to the United States, even though it was not a direct combatant at this stage. Soviet analysts were naturally aware of the huge American contribution to the British Empire's war effort, but they lumped US resources squarely with those of the latter as if they formed a military alliance. British Empire and US steel production, for example, was assessed as double that of Germany, Italy and Japan.³¹⁷ The Russians were also extremely aware of the American lead in aircraft

production, both in quality and quantity.³¹⁸

Hindsight obviously affects our reading of Soviet analysis just before the German invasion in June 1941 and the US entry into the war in December. Nevertheless, the attention paid to the military and economic power of the US and Army General Zhukov's comments in a speech entitled, with prophetic familiarity, 'The Year of perestroika', suggest that the form of the war as it would develop was already known.

'Even the USA, formally not a combatant, in fact exercises a powerful influence on the war in Europe and Asia [he was not referring to the far eastern war: Japan had not yet attacked Britain or the US]. The second Imperialist War has in fact become a World War. Judging by data in the Swiss newspaper Nazionale Zeitung, the population of the countries involved in the war is 1,526 million. Only the Soviet Union, as usual, (poprezhnemu) stands outside the war...

Around Soviet frontiers the flame of the Second Imperialist War burns ever more fiercely. "The whole population [says Stalin] must wait in a state of mobilisation readiness before the danger of a military attack, so that no "accident" and no trick by our external enemies can take us by surprise".³¹⁹

The Soviet view of future war in the 1920s and 30s as likely to involve an attack on the USSR by a capitalist coalition, and Marxist-Leninist emphasis on economic factors may have exercised some influence on Soviet perceptions. The USA was the greatest capitalist power: therefore, it ought to be involved, even though military events at that stage were taking a different course.

Meanwhile, manoeuvres and war games proceeded to determine Soviet conduct of military operations if that became necessary. According to the recently published testimony of M V Zakharov, who had become an assistant to the Chief of the General Staff in 1938, a new plan for strategic deployment was adopted at the end of 1940, which required the mobilisation plan to be re-worked.³²⁰

Zakharov confirms that by spring 1941 it was 'quite clear'

to the Central Committee and Soviet Government, as well as the General Staff that Germany was preparing to attack the Soviet Union.³²¹

In January 1941 the Operational directorate of the General Staff ran two operational-strategic war games. 32 officers and generals took part, with a staff of 55 assisting in running the game. Zakharov recounts the course of the first war game in great detail, and it was clearly highly significant. 'The scenario, created for the war game, abounded with dramatic episodes for the eastern [Soviet] side; they resembled the events which unfurled on our frontiers in June 1941 in many ways'.³²²

The game was set seven months hence, in July 1941. The choice of predicted timescale was undoubtedly based on the best intelligence available, and may in part account for the surprise achieved by the Germans when they attacked on 22 June. The 'western' (German) side were to begin their main thrust south of Brest, with 60 divisions in the first echelon, on 15 July. The initial objective was the line Baranovichi-Dvinsk-Riga, to be reached by 15 August.³²³

The main objectives of this, as of any comparable war game, were 'to work out and master the principles of modern defensive and offensive combat'; to practise commanders in organising and planning front and army operations and cooperation between different arms (including the fleet). Specific questions included

'The defence of the state frontier during an attack by superior enemy forces; withdrawal to a prepared defensive belt; conducting limited operations to defeat the enemy in operational battles near the frontiers; overcoming forward defensive positions; capturing fortified regions; breaking through field defences; organizing pursuit and assault river crossings by a cavalry-mechanized army, and also mountain passes'.³²⁴

Although concentrating on the centre of the western frontier, the game would also study the Baltic and South-Western theatres.

The second war game took place from 8 to 11 January. This studied the same problems but whereas the first had been confined to a relatively limited, marshy and heavily wooded region, the second covered a far greater area including mountain and steppe and many water obstacles.³²⁵ As in the first game, there was great emphasis on fortifications. With hindsight, it is easy to forget that at the beginning of World War II permanent fortifications had reached the highest stage of development in their history, spurred on by the experience of the First World and Spanish Civil Wars. Although well aware that the Germans had been able to outflank the Maginot line, the Red Army had been unable to outflank the Mannerheim line protecting Finland and, not unnaturally, attached great importance to such operations. This emerges clearly from the contemporary sources.³²⁶

There are certain inconsistencies in Zakharov's account,³²⁷ but it seems likely that the war game did 'overestimate our [the Red Army's] defensive abilities somewhat', and therefore 'did not provide realistic propositions about the character of actions by forces in the opening period of [a] war'.³²⁸

Zakharov suggests that an influential body of opinion was wedded to the experience of the First World War as the source of all knowledge relating to the mobilisation, deployment and concentration of forces, which would certainly reflect the large volume of analysis during the 1930s. However,

'In the new conditions of war: of a war of motors and various types of powerful military technology, a high standard of training was required above all, a whole system of properly worked out methods and resources to repel massed offensives by powerful forces of mobile formations with powerful air and artillery support.'³²⁹

But there were also 'positive sides'. The war games supported the general move back towards large mobile formations, which had been broken up at the end of 1939

Figure 3.5. Zhukov's plan for a pre-emptive strike against Nazi Germany, 15 May, 1941.



(devised by the author and executed by the design department of The Independent for use with the author's article 'Stalin's plan to cripple Germany', The Independent, 14 April 1990, p.12)

after a bad showing in Poland, but then reintroduced with a vengeance in mid-1940 after the German triumph in France, though without the necessary equipment or trained personnel. Most importantly,

'Higher commanders had significant experience in controlling powerful front-level higher formations in the complicated circumstances of manoeuvre action in the opening period of a war, over large territorial expanses. Already it had become clear, that in future front operations would form a component part in larger-scale operations by groups of fronts'.³³⁰

From this time on, the author is arguably dealing with immediate plans and preparations for imminent hostilities rather than visions of future war as understood for the purposes of this thesis. However, in the light of new evidence which emerged shortly before this study was completed, it would not be improper to allude to the plan for a limited pre-emptive strike against Germany signed by Army General Zhukov on 15 May, 1941.

Communist of the Armed Forces confirmed that Zhukov approved and signed a plan to launch 150 Soviet divisions against the 100 German divisions which were stationed in the territory of the former state of Poland and preparing to attack the USSR. The plan aimed to split the Germans from their southern allies and encircle the main German group of forces, as shown in figure 3.5. The second phase of the operation aimed to occupy all the territory of the former Polish state, and east Prussia.³³¹ It appears to be a reasonable and workable plan, although, given the German superiority in experience, efficiency and training, it still posed considerable risks. The Soviet author of the article, who claims to have seen the plan, appears to be in no doubt that such an action would have crippled Germany and made a successful assault on the Soviet Union impossible. Reputable sources indicate that on 15 May the Kremlin received information from Richard Sorge, the Soviet agent in Tokyo, that a German attack was definitely

scheduled from about 20 May. This may have provided Zhukov with the firm information he needed to present the plan to the political leadership.³³²

By 1941, the Soviet view of the next war in which the Soviet state would be involved therefore comprised a war 'of reserves and motors'. This conviction was at the core of the great industrialisation of the 1930s, and had grown out of the experience and study of World War I. Besides an awareness of technological development itself, it reflected the understanding that in war, technological innovations were only decisive if utilised en masse, and the singular Soviet view that mass and quality had to be combined. S Vishnev was a regular contributor to military journals on the spiralling implications of mass rearmament. While ostensibly analysing 'problems of the rearmament of foreign armies', he described this process in 1932:

'Numerous examples from the experience of previous (minuvshikh) wars underline this rule: super long range bombardment of Paris in 1918, tanks, chemical weapons, air bombardment - all these innovations (noviki) of military technology have not given the necessary results because of the inadequacy of their mass effect at the time of their appearance. On the other hand the old, well known military means (for example, machine guns, artillery), used in unexpectedly large quantities and in a concentrated fashion, often created a qualitatively different, incomparably more powerful effect. There is every cause to think, that in the future types of weaponry will give serious results only in conditions of their mass employment. However does any army have the ability to fully equip itself with the very latest types of weaponry in sufficient quantities?'³³³

Vishnev's analysis set out the blueprint for what became the Soviet evolutionary philosophy, with particular stress on variants of standard equipment.³³⁴ His comments were vindicated with the relative ineffectiveness of German secret weapons against allied forces using relatively conventional means in unprecedented numbers. The former ,

deployed or planned, included V1s, V2s, the planned super long range gun, jet aircraft, surface to air, air to air and air to surface missiles, The latter were of good quality, though not at the absolute cutting edge of innovation, as were the products of German genius. The technological innovations that had a decisive effect were employed en masse but in secret, for example radar. This highlights the particular and different character of the nuclear weapon. At first sight, dropping one of only a couple in existence on Hiroshima would appear to violate Vishnev's prescription. But it embodied so much 'mass' in its very character that it worked. Nonetheless, it was a gamble: had the Japanese not been on the point of surrendering anyway, and had they known that the Americans did not have many such bombs, the result might have been different.

The Soviet writers therefore forecast a war in which industrial strength and natural resources would be paramount; a war involving the whole of society, with draconian, unprecedented control and exploitation of every man, woman and child. It would not be a 'little war'. Yet it would be a war in which the opening period was, once again, crucial. If this phase were badly managed, disaster could ensue, as happened in the case of Poland, Norway, France, Belgium Holland. At best, geographical situation, natural resources and overall strength might enable a nation defeated in the 'opening period' to claw back its position, but at great cost, as happened with Britain and the USSR. In addition to technology itself, the expertise to use it, and overall 'culture' would also be crucial. The economic, technological and demographic resources of the United States would be decisive.

Even more than World War I, it would be a 'serious examination', to quote Svechin, of the entire national organism. It would be a war of huge actions at the operational-strategic level, by groups of fronts, with

massive armoured formations employed to strike deep and exploit breakthroughs in immensely strong fortified fronts. The Soviet commentators appear to have agreed in general, if not always in absolute detail. The military put forward plans to preempt a possible attack, which could arguably have worked. They were terrified of being taken by surprise.

Once again, the Soviet General Staff, the staff of the Military Academies, other informed writers and the occasional litterateur had got their view of the next land war about right.

3.3. FUTURE WAR AT SEA, CA. 1880-1945

'Naval power is assembled with great care, according to the traditions of the past and the requirements of the present, but, without foreseeing the future, it will come to total bankruptcy.'

Admiral Ob in Morskoy Sbornik, 1886, cited in the fictional future war novel The Cruiser "Russian Hope", 1887.³³⁵

During the 1860s, the Russians paid great attention to the lessons of the American Civil War. On the one hand, the disproportionate damage inflicted by the Alabama and other Confederate cruisers demonstrated the possibilities of 'Kreyserskaya voyna'- 'cruiser warfare' by a weaker naval power against the commerce and trade of a stronger. On the other, the United States, though an advanced industrial power, occupied a naval position not unlike that of Russia in relation to Britain and France. Furthermore, before the writing of Mahan at the end of the century, United States naval thinking emphasized commerce destruction and coast defence. It was thus thoroughly understandable to the Russians. During the 1860s, Morskoy sbornik contained many articles on American naval technology, and when the Naval Ministry began an intensive study of mine warfare in 1864, it began by using American reports.

The lessons of the Crimean War, particularly the Baltic

where British and French warships with their deep draught had been unable to get to grips with the shallow-draught gunboats used by the Russians, also reinforced Russian interest in Monitors. These were named after the USS Monitor, the low, turreted ironclad which engaged the Merrimack in the first battle between such ships. Ten were launched in 1864. They were similar to the American Civil war Monitors, except that the Russians preferred smaller and lighter guns, as they were more easily handled. this preference for lighter and handier artillery permeates Russian and Soviet naval (and to some extent also land) thinking.³³⁶

Mention must be made of the two extraordinary Popovkas, the circular ships designed by Admiral Popov in 1873-75, some of the most extraordinary ships ever built. Designed to provide a stable platform for their heavy guns, and carrying heavy side armour, they proved utter failures, whirling helplessly in the currents of the Dnieper. They were one of the more extravagant Russian 'future war' fantasies.

More significant was a growing interest in fast commerce-raiding ironclads to roam the high seas. Eight small ironclads carrying 6-inch guns were built during the 1870s, but these had somewhat limited range and in about 1870 Admiral Popov was asked to draw up plans for ocean-going cruisers, of which two were built.

During the later 19th century a major naval revolution occurred less than every ten years. The British and French composite battleships of the Crimean War were replaced by the revolutionary ironclad Warrior, and another generation separated this from the Devastation of 1873, which had multiple turrets, no sails, and looked like a recognisably modern warship. The British led every one of these revolutions. Russia had no way of matching these developments. Yet Britain was her most probable enemy, as the two empires drew closer in Asia. The Russians wisely

declined to take on the British on their own terms, and continued their interest in mines. During the Crimean war the British ships Merlin and Firefly were badly damaged off Kronshtadt after striking mines, where the impact broke a glass tube inside releasing acid which detonated the main charge. The Russians also developed a much more powerful mine placed on the sea-bed and fired electrically from shore. A school of mine warfare was established in 1875, and the Nikolayev Academy began courses in mine warfare in 1877.³³⁷

At the outbreak of the Russo-Turkish War in 1877, Russia was infinitely stronger on sea than on land. The Turks, however, did not capitalise on their naval superiority. But the Russians employed all the weapons available to them: coastal batteries, mines and primitive torpedo craft. In spite of the unreliable torpedoes available, the torpedo attacks were daring and relatively successful. There was also a plan, formulated by Admiral Popov, to lay mines to shut the British out of the Black Sea. In the event, a study by Engineer-General Count Eduard Tottleben (1818-84), the famous fortress engineer, determined that it was too late to lay the mines before the British could intervene, and that the Russian minelayers would be excessively vulnerable to Turkish shore batteries. Reluctantly, the Russians abandoned yet another promising foretaste of future war. Before the Congress of Berlin reached a settlement, the Russians deployed 22 cruisers worldwide, to positions where they could attack British commerce.³³⁸

Commerce raiding provided the main scenario for the fictional but expert future war novel The Cruiser "Russian Hope" (1887), by 'A.K.'. Vice Admiral A K Belomor was the author of the other notable future war naval fiction work of this period, and it seems plausible that he may have authored The Cruiser "Russian Hope" also.

The Russian Hope is despatched from Kronshtadt before

the outbreak of war with Britain, which begins in Central Asia. The Captain has sealed orders to be opened when the cruiser reaches 44° N, 031° E. The writer alludes to the Alabama incident which, he says, proved to the Russian Admiralty 'the terrible power of cruisers in a war with a naval and commercial nation'.³³⁹ The cruiser itself is described, although it is 'far inferior to the one projected by Morsoy Sbornik, by the anonymous author of the article "Future Men of War".³⁴⁰

The Russians proceed to sink large quantities of British trade. although with a scrupulous regard for international law. Most intriguing is the capture of the City of Birmingham which is carrying 50 collapsible torpedo boats which the dastardly British plan to carry overland from the Persian Gulf to the Caspian Sea. They then plan to launch them to wreak havoc on the flank of Russian forces in Central Asia. One can only admire the ingenuity of the Russian author, a senior officer 'A.K.', which may have exceeded that of the British themselves. The Russians win the war, as the attacks on the nerve system of the British empire have a disproportionate effect. Ireland and almost all India rise in revolt; Australia experiences displeasure at Britain's inability to protect it; the Russian Army reaches the Indus and the Navy sets fire to Bombay harbour.³⁴¹

The introduction to the English translation notes the 'calm assumption that our navy is incapable of taking its own part, and is inevitably doomed to succumb in a conflict with that of Russia'.³⁴² The 'frank hostility towards this country animating the whole composition lends a pungent zest to the flights of fancy...'³⁴³ It is clear that in the 1880s war between Britain and Russia was more likely than at just about any time before or since. However, the need to maintain and raise morale of the Russian navy emerges as a key issue. Always the Cinderella service in Russia, the navy appears to have suffered

continual crises of morale. Fred T Jane, the notable British analyst of naval affairs, made this point in The Imperial Russian Navy in 1904, a book which eulogised Russian naval power and foretold the day when the 'white flag with the blue St Andrew's Cross' of the Imperial fleet would 'one day rule the seas, as the white flag with the red cross of St George now rules it'.³⁴⁴ Nevertheless, Jane noted that 'Ivan realises that he exists to be shot at, Jack, that he exists to shoot at others, and this psychological difference is... all the difference in the world'.³⁴⁵

The importance of professionalism and morale as a concomitant of constantly evolving equipment also permeates another future war novel produced in this period of extreme antipathy between Britain and Russia. Vice-Admiral A K Belomor's The Fatal War of 18?? (1889) is a more minute and considered scenario than the Russian Hope, and not restricted to war at sea. It provides startling predictions of the Great War of a quarter of a century later. The Germans invade France and reach the environs of Paris, just as they did in 1914. They lay their 'heavy hand' on Belgium and Holland. Finally, Germany begins to present a threat to Britain at sea. However, Belomor makes the same error as Bliokh: Russia, with 120 million people, is not threatened, behind her 'unassailable frontiers'.³⁴⁶ The Abyssinians attack the Suez canal and sever Britain's communications with India. The 'new naval power', Germany, requires colonies overseas. But 'which colonies could be more useful, more accessible, more desirable, than Britain's?'³⁴⁷

Belomor likens this world war to the Punic Wars, but 'still more terrible, more horrific, than ancient history'. It is subsequently christened by historians and writers 'The Fatal War', a name which carries much the same sense as 'The War to end War'.³⁴⁸

Belomor uses the interesting analogy between cruiser

warfare and partisans. Striking at the enemy's commerce was just like partisans attacking the enemy's lines of communication on land. However, cruisers were not limited to this role which, ultimately, would be auxiliary to the major battles. Belomor also envisaged armoured cruisers having a battle role.³⁴⁹ The Fatal War... is a striking prediction of World War I, virtually unknown to scholars in the west. It was translated into German in 1897.³⁵⁰ Besides the remarkable military-political scenarios, it stresses the continued importance of the human element in war, and the problems generated by changing times and changing technology:

'Tempora mutantur [the times are changing]... [sic] but is there anything less relevant to the fleet than this Latin quotation? There, where everything has to be built successively over decades, and depends on the soul and inner qualities of the personnel, - where yet more ships are not enough. These most sophisticated but, nevertheless, soulless vessels must be driven by people... On the basis of known computations the practical man can even show a certain skill and daring in the construction of hulls. But all these hulls, even if they will be covered with two-foot thick armour, if they will be armed with 20-inch guns, if they will move at the speed of a bird, do they make a Navy?'³⁵¹

Some of the Battleships of World War II came close to Belomor's deliberately extravagant 1889 prediction in terms of armour and gun calibre, while modern Soviet ships, fast attack craft and hovercraft carrying massive cruise missiles arguably fulfil these criteria of firepower and speed, though at the expense of armour protection.

The emphasis on coastal defence and cruiser warfare continued until the mid-1890s, when a gradual shift towards building a blue-water navy began. This was in part influenced by the writings of Mahan, which penetrated Russian naval thinking both directly and through the writing of Nikolay Klado (1861-1919).³⁵² This school was,

however, discredited by the disastrous Russian naval performance in the 1904-05 Russo-Japanese War. After the war, an energetic debate began as to Russia's naval needs, led by Klado, and documented in the pages of Morskoy Sbornik.

Not unsurprisingly, a return to 'cruiser warfare' was one option discussed extensively during the period between the Russo-Japanese and First World Wars.³⁵³ So was a return to coast defence.³⁵⁴ Technological developments were followed enthusiastically, notably the appearance of the Dreadnought,³⁵⁵ sea-planes,³⁵⁶ balloons and airships.³⁵⁷ Foreign literature, particularly British and Italian, was widely translated, on such subjects as 'The warship of the future',³⁵⁸ and 'Flying machines in naval warfare'.³⁵⁹ After about 1910 attention focussed on heavier than air aircraft.³⁶⁰

To its credit, the Russian Naval Ministry does not appear to have allowed itself to be mesmerised by technicalities, or tinker with peripherals while failing to consider basic choices. During 1911 two important analyses appeared. The first covered the 'Present and Future of the Japanese Navy', which already looked forward to 'a future war' in the Pacific, foreseeing the analyses, Soviet and emigre, of the 1920s.³⁶¹ Another addressed the crucial first period of any conflict, 'A Sudden Attack across the Sea as a means of beginning Military operations'.³⁶²

There was also a fundamental appraisal of the questions: why did Russia need a Navy and, if it did, what sort of navy. In 1908, a provocatively titled analysis, 'Why does Russia need a Navy?', was published.³⁶³ In 1913, the first parts of Klado's 'Studies in Strategy' appeared, which it would not be extravagant to suggest, laid the framework of Russian and Soviet thinking about future war at sea until the nuclear era which began 32 years later. Klado pointed out that naval weapons technology was more

complicated and expensive than that used on land. Russian naval strategy, because of her geographical position, was closely entwined with the country's land strategy. Control of the Gulf of Finland out to the Aland Islands was essential to permit movement of Russian land forces, while the Black Sea also had to be held to permit access to the Danube, the Balkans and, through the Straits, to the outside world. In the Far East, a triangle from Vladivostok, to Nikolayevsk, to Khabarovsk and containing most of Russia's Pacific population had to be defended. Klado noted the mineral resources of Manchuria and the central position of Korea. The Japanese interest in this area between the world wars, and the struggle between the west and the USSR over Korea attest to the farsightedness of Klado's geo-political and geo-strategic views. 364

Hitherto, the Russian Navy had shown no particular interest in the vessel which would revolutionise naval warfare more than any other: the submarine. But after the Russo-Japanese war, the submarine appeared to some to offer a relatively cheap but highly effective way of restoring Russian naval power. In 1908, for example, in reply to Captain Rimskiy-Korsakov's article 'Why does Russia need a Navy?', a Lieutenant argued that a force of submarines could perform many of the missions he had outlined more cheaply and efficiently. Rimskiy-Korsakov having established the strategic significance of Korea, the author argued that a 'well organized detachment of submarines', based at Vladivostok, could secure the area, given a radius of action of 2,500 nautical miles.³⁶⁵ Whereas surface ships were highly visible, and rapidly became out of date, the same did not apply to submarines. Even if obsolescent, they could still do the job they were designed for, a remarkably perceptive point.

'I do not deny the need for a balanced surface fleet [lineyny flot]: it is necessary as an aggressive weapon for operations in distant seas far from our own, for demonstrations, bombarding

fortresses. Russia, as a great power, needs such a fleet. But now, when all our sea frontiers lie completely undefended before our enemies, a balanced surface fleet would be a luxury for us.

It is necessary to build a submarine fleet independent of external influences, to guarantee defence of our coasts and to fulfil the most important strategic missions... a submarine fleet can be used for its role independently of the shipbuilding programme of our rivals, and every boat represents a most important and independent military entity, even if it is of an obsolete type.³⁶⁶

Already, some Russian officers were talking in terms of a navy of 500 submarines and little else, an extravagant and extreme position, but one not inconsistent with the penchant of some Russians to advocate early and massive re-equipment with new means of warfare.³⁶⁷ It was a view that would find favour in the early Soviet period, and has been reflected in the Soviet emphasis on submarines ever since.

The need to recover the position lost in 1905 rapidly, and general financial stringency led to some remarkable innovations. Russian battle cruisers were more like high-speed battleships, a type of vessel that did not appear in other navies until the 1930s. Three Dreadnoughts laid down in 1911 had guns with a uniquely high angle of elevation, making them the longest range Dreadnoughts afloat. This, combined with the Russian purchase of the Pollen fire control computer, invented by a British officer to perform the complex calculations needed to hit a moving target from a moving platform, and an excellent short-wave radio system for fire control, meant that Russian naval gunnery proved highly advanced during World War I.³⁶⁸ There were also a number of remarkable innovations in naval aviation (see 3.4, below).

During the decade from 1922 to 1932 naval limitation treaties retarded naval developments. Although the RSFSR did not participate in the 1922 Washington Treaty on naval

limitations, she benefitted from this as she was in no position to compete in any naval arms race. Only with the five year plans could serious rehabilitation of the navy begin. A naval construction programme was announced in 1928, which included some submarines and naval aircraft. The more far-sighted considerations of future war focused almost exclusively on land-air operations. Triandafillov's Character of the Operations of Contemporary Armies does so by definition, but Svechin's Strategy also largely ignores naval matters, with the exception of transporting armies across the sea, which he deals with under the heading of 'communications'.³⁶⁹ Finding fault with Svechin's views on naval forces therefore presented his critics in the 1931 Leningrad Komakad session with a problem. The short section criticising Svechin's views on naval forces began by condemning his lack of emphasis on the role of 'Red Commanders' and his likening the Red Army's occupation of Poland to the conquests of Genghis Khan, and had nothing to do with naval matters at all. Not until the fourth page out of seven did the critic admit that 'in fact, in all Svechin's Strategy you will not find a single word about naval forces or maritime theatres, except for a single example from the 16th century, concerning the Spaniard Fernand Cortes'.³⁷⁰ The critic chose to ignore Svechin's treatment of Napoleon's invasion of Egypt, but turned to The Evolution of Military Art, where Svechin had 'totally denied the significance and necessity of the Navy in the general system of armed forces'.³⁷¹ Svechin's emphasis on the strategic defensive was held to blame. Svechin was prepared to let the enemy seize forward cities and industrial centres, and therefore coastal regions were also a low priority. Svechin's emphasis on the strategic defensive on land was likened to the classical emphasis on command of the sea advocated by B B Zherve, (1879-1937), a lecturer at the Naval Academy from 1918 and its Chief from 1928 to 1931.³⁷² This seems a

somewhat tenuous argument. Svechin's argument that the Russian army could only achieve technological parity with the Germany if Russia forsook development of a new navy after Tsushima was criticised as 'for the naive and militarily illiterate', although it made some sense, as was his conviction that the development of railways had made assaults from the sea (desanty) easier to counter.³⁷³

The Soviet emphasis on submarines and flotilla vessels, which was similar to the French 19th century 'young school' - jeune ecole - was arguably a function of naval weakness, but could be supported by military arguments. Writing in 1931, Tukhachevskiy sharply consigned major battleships to history. 'After the appearance of submarines a decline in the significance of ironclads is inevitable'.³⁷⁴ He attached great importance to torpedo bombers, a view which World War II vindicated. Ironclads, he said, were designed the wrong way round, with fewer anti-aircraft guns than surface to surface weapons, whereas in fact they were likely to be attacked by far more aircraft than ships. Torpedo craft also had great potential, and were consistent with his view on land and air systems that there was obvious merit in using platforms which were nearly identical with civilian ones.

'Having a speed of 50 knots and more, presenting a small target and with a powerful torpedo armament, these boats can be made ready in huge numbers and used for peaceful purposes, sport, at holiday resorts, and so on. Certain limitations on these boats' seaworthiness make them especially important for the defence of internal seas.

Thus, naval forces are undergoing as fundamental a restructuring (perestroika) of views, and perhaps an even more decisive one, than on land. The old, familiar relationship of views on military forces is changing fundamentally. Gigantic creative thought, freed from calloused traditions, now requires sailors to march in step with the contemporary development of technology and to use all those inescapable possibilities which the industrialization of the country is creating,

and not just to use them, but to use them with maximum effectiveness and determination.

It is also a characteristic feature of naval forces that in the country unprecedented reserves of naval armaments are being created: aircraft, torpedo boats and armed civilian ships'.³⁷⁵.

Tukhachevskiy's comments reflected the views of A P Aleksandrov, who wrote a monograph criticising traditional naval strategy, including the concept of command of the sea, in 1930. He also suggested that the light forces which he and Tukhachevskiy advocated could be produced rapidly, so that productive capacity during a war, rather than strength at the beginning of a war, was the true determinant of victory.³⁷⁶ With all the discussion of the 'opening period of a war', the veteran naval analyst Viktor Novitskiy was prompted to remind readers of the importance of naval forces in 1935. After general remarks indicating that the character of the next ('a future') war had become a subject of debate almost immediately after the Treaty of Versailles, he pointed out the enormous changes wrought by aircraft. Previously, military and industrial mobilisation and strategic deployment had been concealed by a cordon of forces on the ground. Now, these activities could be disrupted without warning from the air.³⁷⁷ Greater use of water transport would help, as, unlike railways, rivers could not be closed by a single bomb. Nor were they so vulnerable to air assault landings (vozdushnye desanty), a comment which shows that the new device of parachute and air-landing which had only emerged in the previous five years had already been incorporated in other areas of military thinking.³⁷⁸ It was unnecessary to protect the route against air attack: merely the individual shipments ('echelons'). His advocacy of water transport was weakened by the unfortunate geographical fact that most of western Russia's rivers ran perpendicular to likely operational lines in the next war, but the security of river crossings would therefore be

paramount.³⁷⁹

Novitskiy also pointed out that transatlantic communications might be critical, alluding to the deployment of American forces in the final stages of the Great War. By this time, allied command of the sea had assured a 'significant level of reliability' to these communications.³⁸⁰ Alongside some rather obvious comments about the relevance of naval forces to securing the flanks of Soviet land armies, Novitskiy pointed to the recent appearance of the German 'pocket battleships', which, he said, absolutely rightly, were 'designed first of all for attacks in the opening period [of the next war] on the mobilisation and deployment of the enemy's armed forces.'³⁸¹ The deployment of 'pocket battleships' before the outbreak of hostilities and their attacks on shipping recall the Russians' own thoughts on 'cruiser warfare' from the 1860s.

An abrupt change in Soviet attitudes to the future sea warfare in which they might be involved occurred in 1936-37, for a variety of possible reasons. These were: Soviet inability to guarantee supplies to the Republicans in the Spanish Civil War; Germany's renunciation of the Treaty of Versailles in 1935; the increasing threat from Germany and Japan, with an increased German threat in the Baltic and Japanese involvement on the Asian mainland, which increased the importance of the Pacific maritime flank; and the emerging realisation that the Jeune Ecole philosophy contained within it an implied scepticism about the capabilities of Soviet technology and industry, combined with the genuine achievements of the first two five-year plans; and Stalin's own vanity.³⁸² The Soviet government decided to build a 'blue-water' navy.

The new policy was announced in Morskoy Sbornik in January, 1938, in an article by I P Smirnov, the newly appointed People's Commissar for the Navy. He cited Molotov's words to the Supreme Soviet, that 'A mighty

Soviet power (derzhava) must have a sea and oceanic fleet, corresponding to its interests, adequate for our great task'.³⁸³ The USSR was now 'a great naval power', an example of reification, of deciding that something must be and therefore saying that it was already attained. Molotov pointed out the great extent of the Soviet coastline, Italian adventurism in Abyssinia and Italian and German intervention in Spain.³⁸⁴ After an extensive quotation from Stalin, Smirnov alluded to the advances of Soviet industry, which 'fully guaranteed the requirements imposed on it by the construction of a great sea- and ocean-going fleet'. He added that 'a modern warship is, from a technical point of view, the most complicated construction'.³⁸⁵

The next month, February, 1938, Smirnov went public in Pravda, saying that 'we need a still more powerful navy, a more modern sea and ocean going navy. so decided the Party. So decided the government. The whole Soviet people so decided.'³⁸⁶ The whole Soviet people had little to do with it, but Stalin could hardly remain oblivious to the high-profile, prestige value of major warships as an expression of the powerful, industrialized state which the Soviet Union had supposedly become, especially in the light of Engels' views on the subject. It was hardly coincidence that the previous year, Morskoy Sbornik had reported the presence of the Soviet battleship Marat alongside 200 other British and foreign warships at the Spithead Review in the English Channel. The British newspapers were duly impressed by the attractive lighting of the ship and the illuminated five-pointed stars at the mastheads.³⁸⁷

The Third Five-Year Plan (1938-42) included a grandiose shipbuilding plan with the addition of two capital ships and two aircraft-carriers. However, there were constant problems with the supply of technology from abroad. Italian design was incorporated into two 59,000

ton battleships laid down in 1938, in Leningrad and Nikolayev, and two battle cruisers laid down in 1939. Italian influence can still be seen in the graceful design of modern Soviet surface warships. But both the USA and Germany refused to pass on aircraft carrier designs. Work on the first battle cruiser, believed to have been named Strana Sovetov (Country of the Soviets), was suspended in late 1940 before the bow and stern sections were added. Photographic interpreters examining German air photographs saw the squared-off hull and believed it was an aircraft carrier, an error which persisted after the war.³⁸⁸

A remarkable Italian analysis of future war at sea was translated in Morskoy sbornik in 1937. The article predicted that the 'navy of the future' would comprise:

- 'big ships "with the strongest possible armour";
- special air defence ships;
- small aircraft carriers for reconnaissance and torpedo carrying aircraft, and aircraft for close-in defence;
- big submarine cruisers
- submarines of a size corresponding to the tasks allotted to them...

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Although the first prediction has not transpired, the remainder form a striking prediction of subsequent naval developments and modern naval forces. Specialised air defence ships, now called destroyers, are a distinct class of vessel, and the Soviet Kirov class cruisers may have a specialised air defence role. The modern small aircraft carrier, sometimes called an anti-submarine cruiser, with helicopters and vertical take-off fighters for self defence, a product of the 1960s and 1970s, conforms to this description: the British Invincible class, the Italian Giuseppe Garibaldi, the Soviet Kiev and Moskva. The 'big submarine cruiser' is represented by the 26,500 ton Soviet Typhoon, and recent Soviet predictions of massive nuclear submarine ships (see 4.7) recall this article of half a century before. The article also

stressed the vulnerability of naval bases to air attack (Pear Harbor), and the need for 'great protected hangars for submarines', a prophecy again fulfilled with the World War II German U-boat pens and the covered silos for submarines in the Kola peninsula.

One area where the Russians remained behind other naval powers was that of very large calibre guns. A 1937 article examined the possible development of future large naval guns of 500mm and 600mm calibre, and howitzers of 750mm and 900mm. Shells might increase in size in proportion to calibre, or elongated while retaining the same calibre or even reducing it. The potential of sub-calibre rounds, so important in the recent and continuing artillery revolution, was not considered in this context although the author did mention superguns with a range of up to 110 km, the Paris gun, which so fascinated Soviet artillerymen in this period. This had used a significantly lightened' special shell, but the potential of this idea to increase the range of large naval guns was not mentioned.³⁹⁰

In the years immediately before the Soviet-German war the Soviet desire to develop a 'blue-water' fleet was constrained by limitations on industrial development and changing political and strategic circumstances. In 1937, the USSR had decided to build up a large fleet at Murmask with access to the open ocean, and reduce forces in the Baltic where treaties appeared to assure the neutrality of Poland, the Baltic States and Scandinavia. By 1939, German aggression necessitated a return of emphasis to the Baltic.³⁹¹ The Nazi-Soviet Pact and the outbreak of World war II caused the British intelligence services to reappraise Soviet intentions and abilities at sea, but the embryonic 'blue-water' navy was not seen as significant. Analysing 'What Naval Action can the USSR take against Great Britain', the Directorate of Naval Intelligence began:

'USSR modern surface vessels at present are few in number and the question can be summed up in one [sic] word: "Submarine action".' 392

Even with completion of the current naval programme, in three to four years' time, the Soviet Navy was only expected to be able to achieve command of the northern Baltic.³⁹³

Of four capital ships and 14 modern cruisers laid down between 1935 and 1941, only four heavy cruisers and one Italian built light cruiser were operational in June 1941. Two heavy cruisers were completed in the far east in 1944 and five 'Chapayev' class cruisers were completed in 1949-50.³⁹⁴ The effect of the Great Patriotic War on Soviet naval ambitions was catastrophic. The blue-water navy envisaged in the late 1930s arguably did not see the light of day until it appeared in updated form the 1960s or even 1970s. This is a reminder both of the extraordinary time taken to build individual major warships, let alone a coherent fleet, and a reflection of Engels' observation that a major warship is the most sophisticated and demanding product of an advanced nation's industry. Only at the end of the 1980s did the USSR produce a fully developed conventional aircraft carrier. Because of the USSR's geo-strategic position, it has not needed such aircraft carriers in the way that more predominantly maritime nations have: the USA, Britain and Japan. However, a search for specific roles and concepts of operations to justify Soviet development of such vessels is unrewarding. As the authoritative Jane's Fighting Ships commented, 'If you have a vessel that can carry and operate 60 or so fixed wing aircraft, its potential roles are as wide as the ocean itself'.³⁹⁵ The uncertainty of the future strategic environment would seem likely to encourage greater emphasis on naval forces, with their unique flexibility.

4. FUTURE WAR IN THE AIR, AIR DEFENCE AND AIRBORNE OPERATIONS, 1914-41.

'Of course, war in the air and the partial replacement of siege artillery with flying machines are still a long way off, but the new means must be evaluated correctly. The core of a fortress, which until now people have tried to protect from the fire of siege artillery in some way or other, presents an area of significant dimensions. It is subjected to explosives thrown from on board airships. Therefore the way of protecting valuable installations and the means of attack from demolition and destruction must be different from before...'

Fortresses and Contemporary Warfare, October, 1914, 396

During World War I, military aviation developed far more quickly than this observer predicted. The Russians had already built the first four engined bomber in the world, the Russkiy Vityaz, which flew on 23 July 1913, followed by the Ilya Muromets (IM) type A, flying on 11 December.. Along with the Italian Caproni Ca30, these were the first large aircraft specifically designed as bomb carriers. The Russian General Staff was impressed with the military potential of the design and ten were ordered. These aircraft were designed by the brilliant Igor Sikorskiy (1889-1972), who emigrated to the United States in 1919 and placed a distinctly Russian brand of technological imagination and flair at the service of the Americans, beginning a long career as an aeroplane and helicopter designer. The Ilya Muromets had a wingspan of 113 feet and an enclosed cabin. Sikorskiy recalled that flying in it was 'just like Jules Verne, only more practical'.³⁹⁷ Sikorskiy stressed practicality, and the IMs proved remarkably rugged aircraft, complete with specially designed fireproof fuel tanks and armour protection below the pilot's cabin. They flew operationally on the eastern front, carrying up to seven machine guns, which made them a formidable opponent for the fighters of the time. One

was even equipped with an experimental 50mm cannon. A total of 80 IMs were built and only three were lost. According to one authority, they 'remain among the "might have beens" of the early history of aerial warfare'.³⁹⁸ But the development of military aviation in the Great War proceeded from more mundane designs produced en masse. The remarkable Ilya Muromets aircraft, well ahead of their time, reflected the divide between long-term vision and immediate utility which can be observed throughout the history of Russian and Soviet development of new means of warfare.

The Russian navy produced one notable vision of the future in 1916 when an American observer reported the launching of seven seaplanes in 14 minutes from a primitive carrier task force comprising two cargo vessels converted at the beginning of the war and three warships.³⁹⁹

During the Civil War, the fledgling Soviet air forces benefitted from the personal interest of Lenin. Lenin appears to have been convinced that aviation would exercise a profound influence on operations and issued a series of decrees on the use of aircraft. These included attacks on enemy forces in the field, particularly cavalry, reflecting the fluid and transient quality of Civil War operations; liquidation of 'banditism' and centres of revolt in the rear of Soviet forces, the distribution of propaganda and for communications.⁴⁰⁰

War in the air is more directly and inflexibly linked to the development of the appropriate technology than warfare on land or even at sea. The Soviet categorisation of the development of air warfare in the 1920s and 1930s is based almost entirely on technological criteria. The first phase, from 1921 to 1929 was concerned with the establishment of an indigenous aircraft industry and the move from wood and canvas aircraft to those made of metal. The second phase, 1929 to 1941, involved the development

of aviation against the background of a more developed industrial base and developing ideas and procedures for the operational and strategic employment of aircraft in war.⁴⁰¹

Soviet inventiveness in the field of aviation between the wars was impressive. Throughout the developed world, military aviation developed rapidly. As one Soviet commentator noted in 1940,

'Since the end of the First Imperialist War, the last twenty years, as it were, aviation has gone further down the road of technological development than other arms of service (rody voysk) have in hundred'.⁴⁰²

It is significant, however, that the 'air arm' is referred to as such, almost as part of the army. This did not prevent consideration of the possible strategic role of air power, however, or remarkable technological feats including parasite fighters carried by the bombers they were to protect; large calibre recoilless guns mounted on aircraft; rocket powered fighters; prototypes of intercontinental spy-planes and high-altitude bombers; air-to-air missiles; armoured aircraft and tanks with wings.⁴⁰³ The rapid development of aircraft technology in this period made it difficult for military thinkers to base their ideas on reliable data. As Triandafillov commented in 1929, 'We can expect, that in the near future these records will become the normal tactical performance characteristics of military aircraft'.⁴⁰⁴

By the end of the 1920s, Triandafillov considered that aviation had the advantage over 'super-long range (sverkhdal'naya) artillery' for striking at the deep rear of enemy armies, because of the size of the projectile, accuracy and effect on morale.⁴⁰⁵ The last is perhaps surprising. There is undoubtedly something more personal about an aircraft attacking you, but on the other hand artillery fire can be kept up incessantly.

A prominent early Soviet air power thinker was A N

Lapchinskiy (1882-1938). His Aviation Tactics was published in 1926, 1928 and 1931 and his work on The Air Army in 1939. In his introduction to the former, Lapchinskiy stressed that air combat was not an end in itself, but 'only a means to attain success on land or sea'.⁴⁰⁶ Lapchinskiy came into conflict with the important naval thinker, Novitskiy in 1929 over an article he wrote in War and Revolution, over the assertion that 'in the opening period of a war aviation will have an extraordinarily wide field of action'.⁴⁰⁷ Novitskiy responded,

In our opinion, in the opening period of a war, the characteristic feature is a struggle for the character of the future war (bor'ba za kharakter budushchey voyny), which develops, first of all, as a struggle for mobilisation and deployment. In these circumstances, seeing that mobilisation and deployment are the basic feature, to a significant degree predetermining the outcome of the military collision, it is essential to concentrate all resources on this struggle'.⁴⁰⁸

Besides the almost unique use of the term budushchaya voyna in this context - the war as it will develop - this quotation once again underlines the importance of the opening period of the war and strategic deployment in Russian and Soviet military thinking.

Lapchinskiy demanded attacks on political and industrial centres at the outbreak of war: Novitskiy thought this dangerous and illogical. It might unite the enemy population behind the war effort, as it arguably did in both Britain and Germany in World War II. If the enemy had not based his war plans on mobilisation of industry, but aimed for a lightning blow at the start with reserves assembled in peace-time, then attacks on industry would have minimal effect. If, on the other hand, he was relying on industrial mobilisation, then at this stage in the war that process would be incomplete and the attacks would, in effect, be against peacetime rather than wartime

targets, and would not have much effect, either.⁴⁰⁹

Novitskiy also criticised the tendency of Lapchinskiy and others to devise missions for long-range bombers which utilised their maximum range -strikes against the 'heart' of the enemy country, when in fact they might be better employed at shorter ranges breaking up the enemy ground and naval forces' deployment. This view presaged the arguments which raged over the employment of heavy bombers against operational and tactical targets before 'D' Day.⁴¹⁰ Novitskiy concluded by warning that Lapchinskiy had talked of air forces being able to begin action 'immediately after the declaration of war'. The Japanese surprise attack at Port Arthur was a lesson to be remembered, he said.

'In modern conditions, in an era when the struggle for mobilization and deployment has become a reality, the significance and results of our military action before the declaration of war have increased so much, that the move towards the readiness of air forces, proposed by Lapchinskiy, is too risky. And not only air forces, but also the command and communications (komandovaniye i svyaz'), must, in modern conditions, be at a higher state of readiness'.⁴¹¹

On 22 June 1941, there was no declaration of war, and a large proportion of the Soviet air forces was destroyed on the ground where it lay. Command and control was paralysed. Novitskiy's worst fears came true.

Tukhachevskiy, who was Peoples' Commissar for Armaments from 1931 to 1934, was particularly interested in aviation. Isserson gives a unique insight into his talents.

'Having command of several languages, Tukhachevskiy followed foreign literature and was au fait with all new technological developments and inventions. He had a very inventive mind and often flabbergasted the engineers by setting completely new tasks. That happened with torpedo carrying aircraft. Experimental aircraft were built and tested... So Tukhachevskiy also put forward the idea of mounting a rapid-firing [large-calibre] cannon on an aircraft to the artillery

designer Kurchevskiy. To this, Kurchevskiy replied that a gun on an aircraft could not have recoil and would have to be recoil-less. "Of course" - said Tukhachevskiy - "use the reactive principle and you've got a recoil-less gun". It was done'.⁴¹²

The first Soviet recoil-less cannon(DRP) was constructed in 1926. For aircraft, it gave a crucial advantage in range compared with the standard 7.62mm machine guns. In 1931, two DRP-76 cannon (76.2mm - 3-inch) calibre, were tested under the wings of a fighter. Recoil-less guns appeared to have particular potential for use against large bombers and ground targets. At first, those mounted on aircraft could only fire a single round, but in 1935 guns which could be reloaded in flight were mounted on ANT-29 aircraft. One of the more ingenious designs, The I-12, used the recoil-less cannon barrels to form the aircraft's twin tail booms. Although the Soviet experiments ultimately proved unsuccessful, they illustrate the versatile imagination of Soviet designers.⁴¹³

Tukhachevskiy, writing in 1931, drew attention to work on raising the ceiling of aircraft flight, including making engines able to operate in the stratosphere. This, he said, in turn allowed speed to be increased in the less dense atmosphere.⁴¹⁴ Aircraft operating at this height were also more difficult for enemy aircraft and ground fire to engage and moved above cloud and rain. In the 1930s Soviet designers devoted much attention to high altitude flight, especially the construction of pressurized cabins. Prototypes of the BOK-11, a strategic reconnaissance aircraft, the 'K' standing for 'krugosvetniy' - 'around the world', were delivered at the beginning of 1939.⁴¹⁵

Tukhachevskiy noted the potential of the autogyro, invented by the Spanish inventor la Cierva, in 1919, and early work on helicopters. An artillery officer, Boris

Yur'ev, had designed a helicopter in 1911 while working under the aviation pioneer N E Zhukovskiy at the Moscow technical school. In 1930 Yur'ev had built a helicopter, TsAGI-EA, which attained an altitude of 605 metres in 1932.⁴¹⁶ Tukhachevskiy must have been aware of these developments.

Tukhachevskiy also referred to increases in gun calibre and thus the range of air-to-air engagements, increasing to several kilometres. This not only referred to his interest in the ultimately unsuccessful large calibre recoil-less cannon, but also the rapid firing cannon which became increasingly important in air combat during World War II.

Improvements in bomber aviation were not only a function of the armament of individual aircraft, but of their 'collective armament', that is, fire and bomb-aiming by flights and squadrons. This question requires not only a system of armaments, but also the development of new methods of fire control'.⁴¹⁷ This foreshadowed the deployment of US B-17 aircraft in groups which permitted mutual support during World War II. A combat wing of 54 aircraft each carrying about 9,000 rounds of ammunition could bring 648 0.5mm machine guns to bear.⁴¹⁸

The Soviet interest in the collective effects of air armament was also evident in the early development of air-to-air missiles. Tukhachevskiy supported the work of the 'Gas-Dynamic Laboratory' (GDL) which produced rockets for the land-based katyusha rocket launcher and for aircraft. Heavy 82mm and 132mm missiles were intended for attacking ground targets: the 76mm missiles, first tested in late 1937, were designed to break up groups of enemy aircraft, so that the individual aircraft were then more easily destroyed.⁴¹⁹

Tukhachevskiy also noted the greater resilience of heavy bombers built of metal, again foreshadowing the B-17 which, besides being all metal, incorporated 30 pieces of

armour.⁴²⁰ 'The country which builds the strongest aircraft will have an enormous advantage', he said, and 'the strongest country in a future war will be the one that has the most powerful civil air fleet and aircraft industry'.⁴²¹ Tukhachevskiy was undoubtedly right: in the next war, it was the United States.

Tukhachevskiy also referred to 'very secret' experiments with a reaktivny motor, which could refer either to a rocket or a jet engine.⁴²² A number of experimental rocket-powered aircraft were built in the USSR in the 1930s. Soviet interest in rockets may have distracted them from work on air-breathing jets. Although one A Gorokhov allegedly designed a jet engine as early as 1912, a book on the theory of jet propulsion was published in 1929 and the rocket pioneer Tsiolkovskiy designed a jet engine in 1932, Soviet development of jets was behind Germany and Britain. The first MiG and Yak jet fighters did not fly until 24 April, 1946.⁴²³

Tukhachevskiy realised that the greatly increased importance of aviation was likely to reduce close cooperation with ground forces to 'ancillary status'. Their main role would be 'the so-called "independent" operations of air forces in cooperation with land and sea forces on a wider scale.'⁴²⁴ These independent operations would consist of both bombing and airborne operations. Tukhachevskiy's most prominent pioneering role was in the field of airborne forces: parachute and air landing troops. The parachute designer Grokhovskiy experienced a number of failures, but Tukhachevskiy supported his work, leading to the world's first large-scale experiments with airborne forces in the early 1930s (see Appendix H). His stress on the need for mechanized airborne forces was extremely far sighted: one of the problems with airborne or air-landed troops is that they tend to be too lightly armed and insufficiently mobile to deal with heavy conventional forces.⁴²⁵ It should not be thought, however,

that Tukhachevskiy advocated the independent use of air power as some did in Britain. He seems to have agreed with Lapchinskiy that in the end air forces existed to assist victory on the surface. Thus, although he saw 'independent' operations by air forces 'in cooperation with land and sea forces on a wider scale', they were not totally independent of land and sea forces as were many of Bomber Command's operations in World War II. He described the role of 'large-scale, motorised airborne forces' as to 'seize the enemy's railways, putting the key lines out of action, paralysing the deployment and mobilisation of his forces.' These were still military objectives. Thus, he said, one could 'turn previous operational concepts inside out' (perevernut). By this, he appears to have meant beginning the war behind the enemy and preventing his coalescing, rather than starting in front of him and having to break through and then splinter a deployment already formed.⁴²⁶ It must be said, however, that nobody in World War II succeeded in doing what Tukhachevskiy envisaged on any scale.

By 1934, it was recognized that modern aviation was as far from that of 1918 as the German Gotha raids on Paris and London were from Bleriot's Channel crossing. 'There is no doubt, that in a future war aviation will play a still greater part, which the reinforced air forces of the bourgeois states also supports'.⁴²⁷ The problem of air defence was particularly acute. Drawing on the experience of World war I as the 'prototype of machine warfare, and of chemical warfare, those responsible for Soviet air defence drew the same grim conclusion as their foreign counterparts. They believed that chemical weapons would be used against civilian targets, a belief dramatically illustrated by the issue of gas masks to every man woman and child in Britain at the outbreak of World War II.

'The task of defending a large number of population centres against air attack is extraordinarily complicated and requires

huge resources, which remain fixed to the ground while aviation is relatively free to choose its targets. And then, the very means of destruction, used by aviation, have been developed significantly. In particular, during the World War attacks on population centres did not use chemical weapons. Now, regardless of the reassuring discussions of bourgeois states concerning a renunciation of chemical weapons, we can say with conviction that the imperialists will use all the weapons of destruction at their disposal, including, obviously, chemical.⁴²⁸

The writer in the Soviet Air Defence Journal took issue with the theories of the Italian air power theorist Douhet, that an independent air war could take place and that command of the air could be achieved, making air defence unnecessary, since the enemy could be destroyed at will on his bases. A diametrically opposite view was expressed by those who exaggerated the role of air defence as an independent form of war. Some placed stress on massive deployment of anti-aircraft guns: others on fortification of population centres and industrial areas. The former view was exemplified by the British writer General Ashmore, who believed that anti-aircraft artillery could virtually remove the air threat. The latter was popular in France, based, fascinatingly, on the ideas of the renowned French architect le Corbusier. Towns might be designed specially to be less susceptible to air attack, houses could be turned into miniature fortresses, workshops and factories buried underground.⁴²⁹ The latter reflected the 'Maginot mentality' which was also present in preparation for land warfare.

'We know from the writing of a whole pleiad of bourgeois litterateurs, portraying the picture of a future war (kartina budushchey voyny), that the bourgeoisie dreams of dealing with the Bolshevik state using its aviation in particular - a weapon allegedly capable of putting the population "on its knees" in two or three days. Such a picture of war is presented by Major Gelders, who is known to the Soviet reader, in the book The Air War of 1936.⁴³⁰

Whereas Gelders described an air war between France and Britain, a German fascist writer, Axel, had published a book in 1932 called Battle over Berlin. He described a war between a National Socialist Germany and the Soviet Union, in which the Soviet air force is finally crushed by the united forces of a bourgeois coalition, in a few days, 'simply and easily'.⁴³¹ The Soviet author believed that there was a deliberate plan to cultivate the impression among the populations of western Europe that future war would be quick and easy, in order to make them willing to fight, and that bourgeois governments were terrified of prolonged war because, as in the 1914-18 war, it would lead to revolution.⁴³² Whatever the faults of bourgeois thinkers, the Soviet author believed that there was

'for us, a clear and important tendency: one can say with conviction that the capitalist world, in a future engagement (skhvatka) which will be decisive for it, is trying to organize a merciless air war against the Soviet Union, will try to destroy the most important population centres of our country, terrorise the working population and break its resolve to achieve a final victory...'⁴³³

The author rejected the various extremes, saying that, obviously, the struggle for supremacy in the air and the most effective possible air defence were not contradictions. Preparing and organizing the population was also important, through the society for air and chemical training, Osoaviakhim, and the trade unions. 'The enemy in the air, having encroached on Soviet territory', he wrote, 'must be met with a powerful counterblow by well-appointed Soviet aviation, the active resistance of all air defence systems, and the iron organization of the working masses'.⁴³⁴ Photographs from the siege of Leningrad, in particular, paint just such a picture.

Soviet thinkers were clearly concerned about foreign views on the possibility of independent air warfare. In the same year, another perceptive article set out a

balanced view. An understanding of the term 'air warfare' or 'war in the air' (vozdushnaya voyna) had still not been established. Some 'capitalist' thinkers believed that 'war in the air is waged by independent air forces alone in the depth of enemy territory with the aim of moral suppression of the wide masses and dislocating the economic life of the country'.⁴³⁵ But the very flexibility of air forces made this limitation unsatisfactory. The air forces could and should work in conjunction with the army and fleet, and one should not make air warfare, war at sea and on land, mutually exclusive. Air warfare was but 'one of the elements in a complicated and integrated complex of war in all its many forms and unbroken development'.⁴³⁶ The article established three basic categories for air forces: independent air forces, those 'servicing' (obsluzhivayushchiy) the army, and those servicing the navy. The former had three missions: action against independent enemy air forces to destroy, chase off or neutralise them; action against enemy communications on land, sea and in the air; and attacks on sea and land targets, whether military, economic or political.⁴³⁷ However, most of the stress fell on missions which would assist surface forces. The air forces could, furthermore, be assisted in their operations by surface forces, especially mechanized units and cavalry, and airborne landings, which could seize or destroy airfields.⁴³⁸ Purely economic and psychological missions were not favoured, a view which the later lessons of the Spanish Civil War tended to support.

'the theory of terror and destruction, propagated by General Douhet...casts a thick coating over Spain...however, the fascist bandits, having killed thousands of innocent women and children...miscalculated in their attempts to suppress the moral resistance of the Spanish people. The more cruelty the fascist interventionists showed, the stronger became the hatred of the Spanish people for the foreign invaders.'⁴³⁹

The lessons from Spain had formed the core of a wide-ranging, informed and articulate debate in the pages of Krasnaya zvezda during 1938, which was crucial to the development of Soviet air power. It focussed not on whether air power should be used independently against economic and psychological targets (strategic), or against reserves and the enemy rear (operational), but on whether it should be used more operationally or on the battlefield itself, for close support (tactical).

In January, P Mikhailov considered the bombing of Republican towns and cities by Italian and German aircraft. It was only dramatically effective in the complete absence of air defences, he said. The Battle for Madrid had shown that where defending fighters equalled those escorting the attacking bombers in strength, that was enough to see the attackers off. Air defence artillery was particularly effective in breaking up bomber attacks. In some cases the 'rebel'(fascist) aircraft had scattered with the first bursts of ack-ack fire.⁴⁴⁰ However, he noted the effectiveness of land-based bombers against naval targets, although the heavy anti-aircraft armament of modern ships forced them to fly high.⁴⁴¹

In April, another article said that while conclusions drawn from the employment of land forces were of dubious reliability, 'prognoses, made in relation to the use and role of aviation in a future war can now be made with more conviction, on account of the widespread use of aviation in Spain'.⁴⁴² In particular, the bombing of Madrid had shown that a population which 'knew what it was fighting for' could withstand any amount of hardship, 'no matter how strong the effect of air action'.⁴⁴³ Meanwhile, Mikhailov had examined the use of fighter ground attack (shturmovaya) aviation, noting that the fascists used only fighter aircraft, for attacks on the battlefield and the immediate rear, while the Republicans also had some ground attack aircraft, and concentrated exclusively on the rear,

attacking supply columns, troops on the move, and air defence installations.⁴⁴⁴

In May, Brigade Commander (kombrig) Ionov began an intense debate on 'Aviation in offensive operations'.⁴⁴⁵

'Every war is distinctive (konkretna) and therefore one must not transfer the experience of one war into the conditions of another mechanistically. Differing war aims, a different military-political situation, a different enemy and Theatre of Military operations may often show questions, which appear immutable from the experience of one or even several wars, in a completely different light.

Analysing the experience of using aviation in offensive operations in the contemporary (sovremennaya) war in Spain one has to take into account those peculiarities, which applied and still apply there.⁴⁴⁶

The most interesting question, Ionov said, was the role of aviation against, on the one hand, dispersed forces and artillery positions on the battlefield and, on the other, the effect against enemy reserves and enemy air. The Spanish experience had shown the former to be relatively ineffective in terms of casualties inflicted but the effect on morale was most significant.⁴⁴⁷ Ground attack aircraft suffered heavy casualties when employed tactically, and therefore needed to be armoured and have high horizontal speed. 'Hedge hopping flight' (breyushchiy polët) was one way of keeping casualties down. However, 'all this leaves the question of action by fighter ground attack aircraft in a great contemporary war open'.⁴⁴⁸ The fulfilment of battlefield tasks would be at the expense of other missions, for example, isolating the area of the offensive from the concentration of enemy reserves ('interdiction'), and combat with enemy air forces.

The deployment of a breakthrough exploitation echelon of highly mobile forces (see 3.2) had not been practised emerged in Spain, but if such an echelon were deployed it would create a range of other missions, which would also affect the use of aircraft for tactical purposes. The same

went for parachute or air-landed assaults.⁴⁴⁹ Ionov's conclusion was that the particular qualities of aircraft: their range and flexibility, made them better suited for interdiction and attacks on the enemy rear - operational uses - than for close-support. In the Teruel operation in December 1937, air forces had been used most effectively to prevent enemy reserves countering the attack, and against enemy air. By achieving air superiority, they had prevented the enemy interrupting the offensive, guaranteeing a 'brilliant victory' for the Republican attack.⁴⁵⁰

Ionov was immediately criticised as one of those who insisted that a 'big ship' must make a 'long voyage'. The critic cited Voroshilov, inferring that all the new mechanical means of war existed to help the infantry, and concluded that three groups of aircraft were required. One was to engage enemy aircraft, one for operational tasks, and one for tactical close-support.⁴⁵¹

Two days later, another critic contrasted the employment of aircraft in Spain with the likely form of future large-scale operations.

'One cannot transfer the experience of the Spanish war in general to the future. Can one in reality, for example, compare the action of a few hundred aircraft, in total, used in Spain (and that only recently) with the action of several thousand aircraft which will appear on (probably even less extensive) fronts in a future war?...The scale of a new European (in other words, World) War will undoubtedly be different. Without corrections, one cannot transfer the Spanish war experience to another situation.'⁴⁵²

The article focussed on PU-36's emphasis on attacking the enemy simultaneously throughout the whole depth. This meant using aircraft against the rear and reserves. But, it said, 'Comrade Ionov wants to convert these general instructions into an operational template'.⁴⁵³ The critic agreed with Ionov that aviation would suffer heavier

losses directly over the battlefield than when attacking deeper targets, but pointed out that in so doing it would save lives and 'valuable materiel' on the ground. 'In a future war aviation will be used on the battlefield often and with success.'⁴⁵⁴

There was little doubt that the Spanish experience had highlighted the complex interaction of different arms as never before.

'One cannot approach the study of war in a mechanistic fashion....However, every war may either underline or contradict and correct, peacetime theories. The wars in Spain and China have refuted General Douhet's theories. But they have shown the growing role of aviation in contemporary warfare in general and most of all on the battlefield in cooperation with ground forces.'⁴⁵⁵

Others thought that Ionov was right, the title of one article. Obviously, aviation ought to be used for attack on those targets which infantry and artillery could not reach. The Spanish experience had shown that aviation had a strong effect on the morale of forces already demoralised by other action, but that the 'universality of the effect on morale remains a thorny problem'.⁴⁵⁶

The debate concluded that 'the use of aviation on the battlefield will be not only possible, but necessary'.⁴⁵⁷

This philosophy was reflected in the design of the famous World war II Ilyushin-2 shturmovik. Ilyushin confirmed the conclusions from Spain in an interview in 1945.

'"We never agreed with the Italian General Douhet who first advanced the theory in 1921 that aircraft would play a decisive and independent role in the next war, and that by bombing towns and vital centres of a country, the outcome could be decided...We believed that in the next war the air force would be an indispensable arm of the land troops. It would carry out independent actions against vital points in the enemy's rear, and do serious damage, but it would not by itself decide the issue. It was clear to us that, in the main, the air force must be used for combined operations with the ground forces

and the navy."⁴⁵⁸

Ilyushin said he discussed the implications of this conclusion with Stalin several times. Stalin took a personal interest in new aircraft designs. The Il-2 shturmovik emerged, the world's only 'flying tank'. The engine, pilot's compartment and fuel tanks were all protected by steel armour, and the pilot's windscreen was of 66 millimetre bullet-resistant glass. It could attack ground targets with machine guns, 32mm cannon, bombs and rockets.⁴⁵⁹ The Il-2 shturmovik provides a classic case study of a clear view of future warfare translated into hardware.

The sobriquet 'flying tank' applies equally to the Mi-24 Hind helicopter in widespread service at the time of writing. It also applied to one of the most extraordinary military aircraft ever built, the T-60 krylya tanka - 'wings for a tank', literally a light tank with wooden biplane wings and a tail. Tukhachevskiy's obsession with the need to make air-delivered forces more resilient and mobile than infantry on their feet appears to have survived his death in 1937. The winged tank was tested in 1942, towed like a glider behind a TB-3 bomber. It was released and glided to a rough landing, its tracks already spinning before it touched the ground. The idea was not developed: one of the more exotic 'might have beens' of future warfare.⁴⁶⁰

Soviet aircraft designers in this period showed remarkable inventiveness, and were assisted by the personal interest of Stalin and the popularity and utility of aviation which was viewed as a vital tool in opening up the vast territory of the Soviet Union. Some of the reports are hard to believe. A recent report based on eyewitness accounts described the testing of an 'invisible plane' in the winter of 1938. It was supposedly built by a team headed by professor G K Kozlov, a well-known

scientist and a faculty head at the Zhukovskiy Air Force Academy, another instance of a military 'academy' being directly involved in research and development of new technology.⁴⁶¹

According to V B Shavrov, a Soviet authority in the field, the aircraft comprised transparent acrylic panels treated with a substance described as 'rhodoid', made in France. This may refer to the use of rhodium, which when electroplated forms a hard, wear resistant, permanently bright surface and is used in mirrors and reflectors. The spars and other structural parts were also coated with 'rhodoid' containing a mirror amalgam. the opaque surfaces - engine cowlings, wheels and cockpit - were supposedly treated with special paint containing aluminium powder. The aircraft was reported to have sparkled unusually while standing on the runway, but in rapid movement was virtually invisible. Work on this 'stealth' aircraft of over half a century ago was discontinued, allegedly because the rhodoid cracked after a short time and also because 'there was no guarantee that the plane would not be seen by more modern means of detection'. Although it might be nearly invisible to the eye, it would be seen by radar, which was under development at the time.⁴⁶²

Despite the long term potential of a wealth of ingenious effort, the Soviet General Staff concentrated on

ingeniously rugged designs produced en masse to assist the land and, to a lesser extent, sea battles. They had little incentive to plan for an independent, long range air offensive and had they attempted to, this might have squandered resources which they could ill afford given their unsophisticated production base. Given the course of events after 1941, the Soviet decision, based on pre-war thinking about the next war and the lessons from Spain, from the fighting in China after the full-scale Japanese invasion of 1937, and Marshal Georgiy Zhukov's exemplary operation in Mongolia in 1939, appears to have been the best, indeed, the only one possible.

3.5. ROCKETS, THE REVOLUTION IN MILITARY AFFAIRS, AND INTERACTION WITH CONVENTIONAL OPTIONS, CA. 1944-77.

The 'Revolution in military affairs' of the 1950s and 1960s and Soviet thinking on the use of battlefield and strategic weapons have, unlike the earlier period, been widely analysed and many of the relevant texts translated.⁴⁶³ Therefore, the author will not deal with this period in any detail, unlike the earlier period or that immediately preceding the present. Furthermore, unlike the earlier period, we have no actual war with which to compare the predictions. However, the briefest survey, including some of the most interesting material, is necessary.

In 1944, even before the German V-2 ballistic missile offensive against Britain began, the remarkably talented General Pokrovskiy published a remarkable article on 'The Use of Long Range Rockets' (Appendix F). Long range rockets firing beyond visual range were relatively inaccurate at that time and Pokrovskiy believed they would be unsuitable for use against moving targets. But they could devastate comparatively large areas as weapons 'of mass destruction', the term now used for nuclear, biological, chemical and some incendiary weapons.⁴⁶⁴ By implication, they would be used, like the V2s and as proposed for the earlier nuclear missiles, against 'soft' civilian and industrial targets. Pokrovskiy portrayed a barrage of several such rockets, to compensate for inaccuracy. US Intelligence reports of 1948 indicate that the Soviet General Staff continued to believe that, given the technology of the V-2 type rockets with which they were experimenting, this would be their modus operandi in a future war.⁴⁶⁵ In October 1944 and March, 1945 the journal Air Force Technology published details of the jet powered, unmanned V-1.⁴⁶⁶

Understandably, it was airmen who dominated the earliest discussion of the dawning the 'Revolution in military affairs'. Major-General of Aviation Tatarchenko

noted the likely emergence of the nuclear balance of terror as early as 1946, before the USSR had nuclear weapons. He noted that air forces now occupied an 'equal place' with armies and navies, operating at the operational and strategic as well as tactical levels. This was a recognition of British and American experience in the war, and a major shift from the Soviet position in 1941.⁴⁶⁷

Under the heading 'The Atomic Bomb', Tatarchenko linked the emerging paradigm change (see part two) with an earlier one, already described, and the first recognisable nuclear arms negotiations.

'The Second World War was the first mechanized war or war of motors [see part 3.2] . But the Second World War was, along with that, a war, in which the widespread use of atomic energy (vnutroatomnaya energiya) did not occur. However, two atomic bombs...on Hiroshima and Nagasaki and also the experimental atomic bomb detonated in New Mexico...were harbingers(predvestniki) of new methods of waging war.

Almost simultaneously with the birth of the atomic bomb appeared a new term - "atomic politics". The problem of utilising atomic energy is discussed in the Security Council of the United Nations Organization... In their presentations eminent American scientists have quite rightly spoken of the very risky attempt to monopolise work in the area of atomic energy... In one of their speeches the American scientists say, correctly.

"We cannot pretend to a prolonged monopoly in relation to the atomic bomb. Other scientists can use the basic principles and, maybe, even more successfully, than we have...The unique bit, which remains secret, - this is the technical details and the technological processes of factories and equipment."⁴⁶⁸

Tatarchenko then turned to the influence of the atomic bomb on the development of armed forces. He cited an article in the British journal Army Quarterly, which had suggested that the nuclear weapon had sounded the death knell for battleships, aircraft carriers and possibly heavy cruisers, but would lead to an abundance of 'flying fortresses' (in fact, aircraft akin to the B-29

Superfortress which the Russians were busy copying to make the Tu-4)⁴⁶⁹ and maybe even larger aircraft.⁴⁷⁰

Tatarchenko noted the potential of jet engines for operating at 'super-height' and 'super-speed', leading to 'super-long-range flight'. In order to enable future aircraft to fly at very slow speeds as well as supersonic, he believed that aircraft would have both jet and non-jet engines, something which has not materialised.

Developments in the USA were noted, which by 1946 included machines 'automatically controlled from the ground, that is, robot aircraft' and guided missiles, the modern term upravlyayemy raket already being in use. He mentioned the possibility of missiles like the German V-2 in future homing in on light, heat or metal, foreseeing infra-red and laser guidance. Television guidance for bombs was also mentioned. The atomic bomb, jet propulsion, radar and radio were identified as the four elements with greatest military potential at this stage.⁴⁷¹

The question had already arisen whether long range bombers would be completely replaced by missiles. Guided surface-to-air missiles, and high speed jet fighters would probably stop the 'giant bomber' from being a cost-effective means of attacking distant targets. Missiles would probably be cheaper, and the Russians noted that from 1944 London and south-east England had been attacked with rockets only. The Germans had also planned to attack New York and other conurbations on the eastern coast of the United States with missiles.

'Undervaluing this new powerful means of waging war would be a fatal mistake. It should be clear to every moderately well-informed person that this new weapon appeared in 1944-45 in its most primitive, initial form. One can scarcely doubt that in future it will receive significantly greater development.'⁴⁷²

However, missiles would not totally replace bombers. 'Of course not!'⁴⁷³ As with navies, the appearance of a new system did not mean that others would disappear. there

would be several types of giant aircraft: bombers, troop-carrying and cargo-carrying.⁴⁷⁴

World War II experience and the appearance of the atomic bomb had already caused a sharp turn in Soviet attitudes to strategic bombing, that is, attacks on the enemy's centres of power and population. During the war 'giant aircraft' (samolety-giganty) had undergone relatively far more development than other types. Besides constant improvements in range, payload and speed, the Soviet Air Forces noted improvements in armour protection, sights, defensive armament, an all-round ('spherical') arc of fire and automated fire control.⁴⁷⁵ In addition to cooperation with armies and navies, emphasized before 1941, air forces would in future carry out 'destructive strikes on administrative-political economic and military objectives in the deep rear'.⁴⁷⁶

'Relating to the form of a future war, the following thoughts are proposed: in future operational battles the place where the main efforts will be directed will be not so much the front as the rear of the enemy. The main military action will be aimed directly against the most important populated regions on the enemy's territory, which must be subjected to air bombardment with all available means, and also to seize them with airborne armies, reaching the enemy's deepest rear in thousands of giant aircraft'.⁴⁷⁷

Tatarchenko's conclusions concur with those of the British Tizard Report of the same year, which assessed that atomic bombs which were still few in number and could only be delivered by large aircraft, would make attacks on economic and civilian targets unquestionably the most profitable form of operations in war, and presaged views on the character of a future major war throughout the late 1940s and 1950s.⁴⁷⁸

Immediately after the detonation of the first atomic bombs, experts were sceptical about its true military value. This scepticism pervades the Tizard report and also

featured in a remarkable letter from the Soviet scientist Petr Kapitsa (1894-1984) to Molotov in December, 1945. The letter was published in 1990.

'The effectiveness of atomic energy against military targets , as used in Japan in the form of bombs, has not been proved. This is not only because its production is not proportionate to the cost, as technology will evidently soon overcome this problem, but mainly because, as calculations and experiments show, in a nuclear "burst"(vzryv), thanks to its small mass, only a part of its huge energy goes into the shock wave (vzryvnaya volna), which therefore does not have the expected destructive power. A great part of the energy is lost as radiation [sic.- surely heat and radiation], which incinerated so many people and houses. One can safely say that if the Japanese had not lived in "paper houses", and had they not been taken by surprise, then casualties would have been considerably smaller, because one can protect oneself against most of the radiation [and heat, presumably] of an atomic blast.

It is also interesting to note that in the atomic bomb in its present form the most precious elements, which are necessary for the production of atomic energy in other substances, are barbarously and irretrievably wasted.⁴⁷⁹

Kapitsa was arguing that atomic energy was far more efficiently used for peaceful purposes, and asking if he might publish an article on the matter. He was told to 'wait' a while, and the article was never published.⁴⁸⁰

The following year, the Air Force officer Tatarchenko noted the global character of future war. The Soviet Union's most formidable and, it appeared, likely adversary, was not accessible by land and enjoyed overwhelming superiority in the air and at sea. The Tu-4 could reach the United States on a one-way mission or with air-to-air refuelling, but the Soviet Union did not develop the latter until the late 1950s. But rocketry, in which Russia and the Soviet Union had always been strong, provided a way of redressing the balance.⁴⁸¹

The first short-range ballistic missile, based on the V-2, was deployed in 1947 and in 1948 Stalin initiated an intercontinental missile programme. Western intelligence noted that there was 'little or no return to the research and study of fundamentals but instead the Soviets seem to be engaged in a vigorous programme of getting test vehicles to the hardware (test vehicle) stage with a minimum of research'.⁴⁸² In 1948 it was noted that the Russians were producing a large number of guided missiles, perhaps because they needed them for testing, perhaps to compensate for inaccuracy. Stalin prize winners in the same year included two awards for research in exterior ballistics which were believed to be connected with guided missile development. The lack of accuracy probably also encouraged Soviet research into a still more powerful nuclear weapon, the thermonuclear (fusion or hydrogen) bomb, which they detonated in 1953. However, only one rocket was developed before Stalin's death in 1953, the SS-2.⁴⁸³

Stalin's successor, Malenkov, believed that when the USSR achieved some form of parity with the United States in nuclear forces, the balance of terror would make conventional conflict more likely than nuclear war (just as chemical weapons had not been used, even in the most dire circumstances) in World War II). His opponents, Molotov, Bulganin, Zhukov and finally Khrushchev, placed the emphasis on strategic surprise and nuclear war. Malenkov was deposed in February 1955 and the way was clear for revision of the view of future war based around mass employment of nuclear weapons.⁴⁸⁴

Meanwhile, the ground forces had been developing the experience of World War II. Sharp reductions in the numbers of men on the ground meant that the available motor vehicles could be used to mechanize the entire army. At this stage, the new technologies had little influence on army weaponry or organization. By 1953, a mechanized

corps had the same mobility as a World War II Tank Army, but just as the USSR sought to balance US air and sea power with a quite different force structure - nuclear missiles, so the massive army in Europe also constituted a counterweight of a quite different material.⁴⁸⁵

Stalin's death in 1953 once again opened up the field of strategy - the conduct of war at the highest level - for study. previously, it had been Stalin's preserve. A study was carried out by the Frunze Military Academy between 1953 and 1957 and endorsed by the General Staff after two years of further study.⁴⁸⁶ It was no coincidence that in 1959 the Strategic Rocket Forces were formed, becoming the elite and primary service, ahead of the army, air defence force, air forces and navy.⁴⁸⁷

The conclusions of the study were incorporated in the book Military Strategy, attributed to Marshal Sokolovskiy, first published in 1962. It was thus nearly a decade from the start of the study to its appearance in public, but its conclusions were radical. Essentially, the Frunze Academy and the General Staff had concluded that nuclear weapons, particularly strategic weapons, were central to the conduct of any future war and not auxiliary or even equal to other operations. From this, it followed logically that equipment organization and procedures should be designed around a full-scale nuclear war.

The work Military Strategy has been translated and every edition analysed in meticulous detail by western commentators, and therefore requires no detailed attention here. A series of articles appeared during the 1960s in the authoritative journal Military Thought which expand upon elements of the study and contributed to its revision.⁴⁸⁸ From the viewpoint of the time of writing, it is clear that the central position of large scale nuclear war in Soviet future war thinking dominated the design of what appear to be 'conventional' systems. The Soviet emphasis on the tank, which has left a vast and

problematical legacy of ironmongery in eastern Europe, arguably stemmed not so much from Soviet experience of tank operations in World War II, but from the fact that the tank, with its armour protection, weight and hermetic sealing was the ideal vehicle for the nuclear battlefield. The same appears to be true in the design of the BMP armoured fighting vehicle. The organization of Soviet forces into a rigid structure of armies, divisions and regiments, a pattern dominant for about 15 years from 1967 to 1982, was suitable for a nuclear battlefield where everything had to be carefully controlled from the top. It was quite inconsistent with the experience of protracted conventional operations in World War II.⁴⁸⁹

During the 1960s the first discussion of war in space appeared. An important article by N Talenskiy in 1964 discussed the dilemma of anti-ballistic missiles (ABMs). Whereas the west believed them to be destabilising, that is, that they made nuclear war more likely by offering some defence against nuclear attacks, the Soviet position was that they gave one the ability to defend oneself regardless of the attitude of the other side.⁴⁹⁰ At the same time, Valentin Larionov, still an important figure in Soviet future war thinking and the composing editor of Military strategy (see part 4), published an article on the '"Doctrine" of Command of Space'.⁴⁹¹ Accompanied by humorous illustrations, Larionov noted that certain circles in the USA were giving

'priority to space research, which indicates that space is regarded by them above all as a theatre of future war'.⁴⁹²

The Apollo programme to put men on the moon was seen as a vehicle for development of space weaponry. The ability to carry out long journeys in space was seen as conferring the potential to deploy 'orbital ships, able to execute a strike from orbit, either at the earth, or at enemy launch sites in space'.⁴⁹³ Presumably the 'enemy' could only be

the USSR.

Meanwhile, emphasis on nuclear war on the surface of the planet continued. According to recent first-hand testimony from Colonel Tsygichko, a European theatre nuclear war was modelled in 1968. If 30 percent of the warheads available then were used, the resultant destruction of the transport grid would mean that no regrouping of forces would be possible at all, and the advance would stop.⁴⁹⁴ Similar conclusions had been drawn from an exercise in the Carpathian mountains as early as February, 1954, and emerged from modelling a nuclear exchange in 1970-71, at which both Brezhnev and Kosygin were present. There was not enough left on the Soviet side to continue hostilities. Nuclear weapons, it appeared, not only made war unthinkable, but actually impossible to fight. Turning to full-scale strategic nuclear exchange, even under favourable initial conditions, with strategic surprise, the Soviet Union lost so much that no-one could speak of 'victory'. According to Tsygichko, the findings of these studies were not accepted, and according to Larionov the Soviet General Staff continued to try to find a way of making nuclear war winnable until about 1985.⁴⁹⁵

It is significant that the authoritative Soviet Military Encyclopedia article (1979) on the Revolution in military affairs is by M M Kir'yan, one of the most prominent modern authors encountered in this study. He does not limit the Revolution in military affairs to the 1950s, to nuclear warheads and ballistic missiles, but describes it as a phenomenon which became more widespread after World War II and, by implication, was still going on. Most significant aspects, apart from 'the nuclear rocket weapon', from the highly economical Russian for a wide range of systems, were: nuclear submarines, rocketry, electronics, automated control systems (see part 4). He placed great stress on the economic base of the countries involved, and the increase in military

expenditure which the Revolution in military affairs had brought about. We thus arrive at the situation which has preceded the recent dramatic changes in the attitudes of east and west to each other, to the utility of warfare, and to military spending.⁴⁹⁶

This selection of past Russian and Soviet views of future war is not exhaustive, but it has indicated that their past views of the character of future warfare have tended to be correct: that the implications of new technology are recognised quite quickly, and that radical solutions to massive problems have been adopted and made to dominate the entire system of procurement and military organization. An example of the latter is the decision to go for missiles because it would be impossible to compete in the sphere of heavy intercontinental bombers. These decisions are not taken hastily, but only after voluminous research and prolonged reflection, typically a decade. This process has always taken place in the military academies and the General Staff, though the personal influence of the leader (Stalin, Khrushchev) can be crucial.

The relevance of the more distant past is stressed in Zakharov's history of the General Staff before the war.

'The experience of events which took place a long time ago, which preceded the Great Patriotic War have not lost their significance, even now. Extracts from it are all the better and more useful to help solve multi-faceted and complex problems of today. In this, historical examples, the lessons of the past lead to critical reflection, not to dogma, to understanding Lenin's words that "Marxism requires absolute historical examination of the question of the forms of struggle. To put this question outside the particular historical situation indicates a lack of understanding of the ABC of dialectical materialism".⁴⁹⁷

Should, as seems likely, the Communist Party lose its dominant position in Soviet intellectual life, the thought processes which have been instilled over the past 70 years

will surely remain for a while longer. Furthermore, the relevance of the pre-Soviet period as a source of precedents shaped by Russian historical experience, geography and climate, but not by Soviet ideology, can only increase.

NOTES TO PART. 3

1. Military-historical commission of the General Staff, Osobiye pribavleniye k opisaniyu russko-turetskoy voyny 1877-78 gg. na Balkanskom poluostrove...soobrazheniya, kasayushchayasya plana voyny, (Special Supplement to the Description of the Russo-Turkish War of 1877-78 on the Balkan Peninsula... Correspondence relating to the War Plan), (General Staff Military Historical Commission Press, St Petersburg, 1901), pp. 27-39 cover Obruchev's two 'notes' (zapiski), this pp. 31-32.
2. Ibid., also p. 29.
3. See C D Bellamy, 'Corps volant to OMG' in The Evolution..., pp. 130-38.
4. See C D Bellamy, 'British Views of Russia, Russian Views of Britain' in P A Towle, ed., Estimating Foreign Military Power, Croom Helm, Beckenham, 1982), pp. 37-76, this pp. 54-55.
5. Skugarevskiy, 'Voyennaya igra...' Vsb 1/1874, p. 59.
6. Ibid., 'The war game is an invention of modern times. The experience of the past fifty years has not established reliable foundations for using it [the war game - kriegsspiel] in practice, whether in the military community, or in literature.' Svechin (1878-1938) was also aware of the significance of this period: he opened the first edition of the seminal Strategiya by pointing out that '55 years separates the last practical exposition of Moltke's strategy from Napoleon's last operation at Waterloo. 55 years separates us [1925] from Sedan' (2nd edition, 1927, p. 7).
7. A Skugarevskiy, 'Novya trebovaniya taktiki v vidu ozhidayemykh izmeneniy v pekhotnom ustave' ('New Tactical Requirements in view of the Expected Changes in the Infantry regulations'), Vsb 4/1876, pp. 304-32, this p. 304.
8. L Baykov, 'Vliyaniye srazheniye pod Kennigretsom na taktiku' ('The Influence of the Battle of Konniggratz on Tactics'), Vsb 6/1872, pp. 303-52, this p. 303.
9. This was the eminent General and military historian Aleksandr K Puzyrevskiy (1845-1904), commissioned into 5 Horse artillery Brigade in 1863 and serving there as a Staff Captain ten years later. SVE, Vol. 6, p. 627. Staff Captain was a rank for intellectual 'high-flyers', employed on staff duties. See also A Leonidov, 'Voyenny istorik A K Puzyrevskiy' ('The Military Historian A K Puzyrevskiy'), VIZh 1/1969, pp. 91-97.

10. Staff Captain [A K] Puzyrevskiy, 5 Horse Arty Bde, 'Obozy i vliyaniye ikh na takticheskiya operatsii' ('Transport and its Influence on Tactical Operations'), VSb 9/1873, pp. 111-48, 10/1873, pp. 343-65, this in part 2 p. 343.
11. 'Zheleznno-dorozhnaya set' v Avstro-Vengrii i gotovnost' yeya armiyi k boyu' ('The Austro-Hungarian Railway Network and their Army's Readiness for War'), (trans. from the German), VSb 5/1871, pp. 225-47, this p. 226.
12. Col E Chenevix Trench, Cavalry in Modern War, (Military Handbooks, vol. 6, Kegan Paul, Trench & Co., London, 1884, pp. 75, 227. See also Jay Luvaas, The Military Legacy of the Civil War: the European Inheritance, (University of Chicago Press, 1959), esp. p. 113.
13. Staff Captain N Sukhotin, 'Nabeg letuchago otryada za vislu' ('Raid of a Flying Detachment beyond the Vistula'), VSb 11/1876, pp. 114-53 and 12/1876, pp. 365-99. He called this an 'Amerikanskiy reydy', leaving no doubt of where he thought the idea came from: part 2, p. 396. Sukhotin also wrote Reydy i poiski kavalerii vo vremya amerikanskoy voyny 1861-65 gg. (Operational and Tactical Raids by Cavalry during the American War...), (Moscow Military district, Staff press, 1875).
14. 'N.Z.', 'Zadachi kavalerii...' VSb 9/1877, p. 26.
15. A N Kuropatkin, 'Pod Plevnoy (praktika transheynoy voyny)' ('Before Plevna (The Practice of Trench Warfare)'), VSb 9/1878, pp. 44-74.
16. Captain Rudzinskiy, 'Pod vpechatleniyami del posledney voyny. Strel'ba i dvizheniye razsypnago stroya 108-go Saratovskago polka' ('Under the Impressions of the Events of the last War. Fire and Movement in open order of the 108th Saratov Regiment'), VSb 1/1879, pp. 67-87. See also A Puzyrevskiy, 'Vospominaniya ofitsera general'nogo shtaba o voyne 1877-78 godov v Evropeyskoy Turtsii' ('A General Staff Officer's Memoirs of the 1877-78 War in European Turkey'), VSb 1/1879, pp. 160-205; A N Kuropatkin, 'Sredstva dlya umen'sheniya poter ot ognya pri atake (Po povodu stat'i G Chebyshev)' ('Means for diminishing Losses from Fire in the Attack (With regard to G Chebyshev's Article)'), VSb 1/1879, pp. 88-104.
17. N P Mikhnevich, Vliyaniye noveyshikh tekhnicheskikh izobreteniy na taktiku voysk (The Influence of the Latest Technical Inventions on Forces' Tactics), (first published St Petersburg, 1893, (cited in Bliokh, Wnioski Ogólne...., Spis dzieł z ktorych autor korzystal), this edition 1898),

in Beskrovny, ed., Russkaya voyenno-teoreticheskaya mysl'... pp. 415-40. 1881 regulations, based on Russo-Turkish War and requiring revision, pp. 417, 424.

18. See also C D Bellamy, The Evolution..., p. 62, figure 3.2.

19. SVE, Vol. 1, p. 62.

20. Sir George Clarke, 'Note on Threatened Invasions of India and their Effect on British policy', 3 April, 1905, Memoranda and Notes by Sir George Clarke while Secretary of the Committee for Imperial Defence 1904-07, (CID Paper, London, 1907).

21. Ibid., p. 5.

22. 'General Kuropatkine's Scheme for a Russian Advance upon India, with Notes thereon by Lord Roberts...' August, 1891. Printed for the Committee of Imperial defence, March 1903, UK Public Record Office, CAB XCIA 632, pp. 1-5.

23. Lt Gen O Kishmishev, Pokhody Nadir Shakha v Gerat, Kandagar Indiyu i sobytiya v Persii posle yego smerti, (Nadir Shah's Expeditions to Herat Kandahar and India and Events in Persia after his Death), (Military Historical department attached to the Staff of the Caucasian Military District, Tiflis, 1889). The Russian General Staff maps illustrate the 'British possessions in India'.

24. SVE, vol. 6, p. 457.

25. VES, (1986), p. 461.

26. Rifles illustrated and compared in Anthony Livesey, The Great Battles of World War I, (Michael Joseph, London, 1989), p. 47.

27. Bliokh cites another work by Mikhnevich, 'Vliyaniye malokalibernogo oruzhiya na taktiku voysk, Budushchaya voyna...Vol. 1, p. 354. L Baykov, 'Ustavnya formy ataki pod vliyaniyem malokalibernago ruzhya i bezdymnago porokha' ('Regulation Forms of attack under the Influence of Small-Calibre Rifles and Smokeless Powder'), Vsb 4/1892, pp. 313-46 and subsequent discussion; V Markov, 'O vliyaniy bezdymnago porokha i novago vooruzheniya pekhoty na deystviya voysk v pole' ('On the Influence of Smokeless Powder and new Infantry Armament on the Action of Forces in the Field, Vsb, 10/1892, pp. 310-47; 11/1892, pp. 49-79 and Yu Lazarevich, 'K voprosu o razsypanii tselykh rot' ('On the Question of extended Deployment of whole Companies, Vsb 3/1899, pp. 89-97.

28. Beskrovny, Russkaya voyenno-teoreticheskaya... p. 35. On Mikhnevich, see also A Ageyev, ed., 'Iz dnevnika N P Mikhnevicha' ('From Mikhnevich's Diary'), VIZh, 5/1976, pp. 69-75, and A Ageyev, 'Voyenno-teoreticheskiye vzglyady N P Mikhnevicha' ('The Military-Theoretical Views of N P Mikhnevich'), VIZh 1/1975, pp. 90-95.
29. Beskrovny refers to the 1898 edition of Mikhnevich, Vliyaniye...; Bliokh, Budushchaya voyna... Vol. 1, pp. 374, 399, 410, 487, refers to the 1893 edition.
30. Mikhnevich, 'Vliyaniye...' in Beskrovny, Russkaya voyenno-teoreticheskaya... pp. 423-25.
31. Ibid., p. 424.
32. Ibid., p. 425.
33. Langlois, Lessons from Two Recent Wars, pp. 36, 39.
34. Field Service Regulations, 1909, Reprinted, with Amendments, 1914, Part 1, Operations, (Harrison and Sons, for HMSO, London, 1914). Ch. 7, 'The Battle', pp. 138, 141, 149-50, quote on p. 141.
35. Edmund Blunden, 'Third Ypres', '...For their new parley setting themselves in array, In crafty forms unmapped...', in Jon Silkin, ed., The Penguin Book of First World War Poetry, (Penguin, Harmondsworth, 1979), pp. 102-03.
36. C D Bellamy, Red God of War. Soviet Artillery and Rocket Forces, (Brassey's, London, 1986), pp. 28-33 and p. 77, note 21.
37. 'The Russian Artillery and the Origins of Indirect Fire', Army Quarterly and Defence Journal, Vol. 112, nos. 2 and 3 (April and July, 1982), pp. 211-22 and 330-37.
38. D A Milyutin, (1816-1912) 'Iz stat'i "Starcheskiye razmyshleniya o sovremennom polozhenii voyennogo dela v Rossii"' ('From the Article "Senile Reflections on the Contemporary State of Military Affairs in Russia"')(1909), in Beskrovny, ed., Russkaya voyenno-teoreticheskaya..., pp. 182-89; this p. 182 'Vsya kartina boya nyne sovershenno inaya, chem vo vremya Napoleona i do nego'. The 93 year-old Milyutin had lost neither his sense of humour nor his perception.
39. Baumgarten, 'Artilleriyskiye voprosy', AZh 1/1896, p. 2.
40. See Part 1, note 4. There were five detailed volumes of the study Budushchaya voyna...; the Obshchye Vyvody

(General Conclusions) is not included in these, and is cited separately.

41. SVE, vol. 1, pp. 500-01.

42. Les Chemins de Fer Russes, Recettes et Dépenses de l'Exploitation, prix de Revient des Transports et Mouvement de Marchandises par Jean Bloch, President des chemins de fer Kiew-Brest, Libau et lodz, Membre du Conseil des Chemins de Fer Russes, (W Drukarni Gazety Lekarskiej, Warsaw, 1875).

43. 'The Military Power of Russia'. Leader in the New York Times, 31 October, 1854, published in E M Aveling and E Aveling, ed., The Eastern Question. Letters written 1853-1856 dealing with the events of the Crimean War, (Swan Sonnenschein, London, 1897), p. 490. On p. 489 Marx had described Poland 'driven like a wedge between Prussia and Austria'. Although these articles bear Marx's name, many were probably written by Engels. Bliokh, Budushchaya voyna, vol. 2, p. 823. 'In that event [an offensive war with Germany and Austria together enjoying the initiative] she [Russia] cannot make use of that wedge, represented by Poland, in order to direct forces immediately into German territory'.

44. Lt Col (General Staff) Simanskiy, Otvet G Bliokhu na yego trud 'Budushchaya voyna v tekhnicheskoy, ekonomicheskoy i politicheskoy otnosheniyakh... (Reply to Mr Bliokh on his work...), (A A Levenson, Moscow, 1898), p. 5, 'Mr Bliokh's wide ranging researches about future war were published as early as 1893-4 in the pages of Russkiy Vestnik...'; Bliokh, Ekonomicheskiye zatrudneniya v sredneyevropeyskikh gosudarstvakh v sluchaye voyny (St Petersburg, 1894).

45. SHAT, Carton 7N 1480, Gen Loisillion, Ministre de la Guerre to Ministre des Affaires Étrangères, (Direction Politique), Paris, 23 April 1893.

46. Ibid.

47. I F Clarke, 'The Great War that never was, 1871-1914', Futures, Vol. 16, No. 6, December 1984, pp. 641-47, this p. 646.

48. VE, Vol. 4, pp. 569-70.

49. Stead, 'Prefatory Interview with Bliokh, English Edition of Conculsion, Is War...p. xii.

50. Ibid.

51. The Bibliography in the Polish edition, Wnioski ogólne..., pp. 342, 349, 351, 356.

52. Obshchye vyvody..., pp. 58-59.

53. A K Puzyrevskiy, 'Budushchaya voyna v tendentsioznom izobrazhenii' ('Tendentious Images of Future War'), Razvedchik (Scout), (St Petersburg), No. 410, 1898, pp. 737-40, No. 411, pp. 755-56, a reprint of Puzyrevskiy's review in the Varshavskiy dnevnik (Warsaw Daily), No. 200, 201, (1898); A I Dragomirov, 'Otkrytoye pis'mo G Bliokhu' ('Open Letter to Mr Bliokh'), Razvedchik, No. 316, 1898, pp. 976-77. The 'open letter' was dated 26 September, 1896, in response to a draft of Budushchaya voyna... on which Dragomirov had been asked to comment, and was reprinted in Razvedchik. Bliokh referred to Dragomirov's objections in his interview with W T Stead, Is War Now Impossible?...pp. xiii-xiv. Puzyrevskiy's criticism of Bliokh is mentioned in L G Beskrovny, Ocherki voyennoy istoriografii Rossii (Sketches in Russian Military historiography), (Nauka, Moscow, 1962), pp. 228-229.

54. 'Izdatel'stvo V A Berezovskogo (Iz istorii izdaniya voyennoy literatury v Rossii)' ('The V A Berezovskiy Publishing House. (From the History of the Publication of Military Literature in Russia)'), VIZh 11/1989, pp. 85-87. Razvedchik is discussed on p. 86. It was first published in 1888 and changed name to Razvedchik the following year. Some 10,000 articles were published between 1888 and 1898. It aimed to address wider questions of interest to the military, in particular general questions of science and technology. Dragomirov's 'Open letter' was followed by an article by the rocket pioneer Konstantin Tsiolkovskiy on a model heavier-than-air aircraft developed by an inventor called Langley.

55. Dragomirov, 'Otkritoye pis'mo...', p. 976, col. 1.

56. Ibid., p. 977, col. 1.

57. Puzyrevskiy, 'Budushchaya voyna v tendentsioznom izobrazhenii', p. 738, Col. 1.

58. SVE, Vol. 6, p. 627. In 1901 he became Deputy Commander of the Warsaw MD, until 1904.

59. Puzyrevskiy 'Budushchaya voyna v tendentsioznom...' p. 738, col. 2(top) and 739, col. 1(top). The Spanish and Americans were both equipped with 'the most sophisticated rifles', and yet there was no talk of mutual annihilation; indeed, the casualties were remarkably light. The Italians' latest armaments had not stopped massed charges by Abyssinians. Neither of these examples was at all

comparable with a major European war, and one suspects that it was Puzyrevskiy who was being tendentious on this occasion. This appears to be one case where a Russian was drawing lessons from 'local wars' too literally.

60. Bliokh, Transvaal'skaya voyna i svyazannye c neyu voprosy (The Transvaal War, and Related Questions), (Trenke and Fyusno, St Petersburg, 1900). Sixteen of Bliokh's specific predictions are listed, all of which had been proved right to some extent (pp. 2-4).

61. Simanskiy, Otvét G Bliokhu na yego trud 'Budushchaya voyna'..., p. 6.

62. Stead conversation with Bliokh, Is War Now Impossible?... p. xiii.

63. Cited in Simanskiy, p. 3 'trud G Bliokha, nesmotrya na yego kolossal'nost', priobrel izvestnuyu populyarnost' v voyskakh'. Bliokh's work (published before the appearance of the complete six volume study) is also directly acknowledged in A Gulevich, 'Voyna i narodnoye khozyaystvo' ('War and the Economy'), Part 1, Vsb 1/1898, pp. 60-75, esp. p. 73. Gulevich blended Bliokh's views with the 'official' legacy of Leyer, Geysman and Martynov.

64. Budushchaya voyna, vol. 1. Opposite p. 354 there is a British photograph showing the difference between cordite (smokeless) and gunpowder.

65. Ibid., vol. 2, p. 754.

66. Obshchye vyvody (Russian edition of General Conclusions), p. 46. The idea of armed 'hordes' or 'mobs' was popular. Moltke is alleged to have described the armies of the American Civil war as 'armed mobs', but this appears to be undocumented; Luvaas, The Military Legacy of the Civil war..., p. 126 note 21.

67. Ibid., p. 48. French Edition, p. 42, is also correct.

68. French Edition of General Conclusions, p. 45.

69. Obshchye vyvody..., p. 49

70. Ibid.

71. Ibid., p. 35.

72. See for example Maj Gen J F C Fuller, On Future Warfare, (Sifton Praed, London, 1928), p. 78.

73. See Bellamy, The Evolution..., table 2.1, p. 48.

74. General Conclusions, French Edition, p. 11.

75. The ability of aircraft to detect movements was crucial at the beginning of the war. See Yuri Danilov, Rossiia v mirovoy voyne (Russia in the World War), (Slovo, Berlin, 1924), pp. 98-99.

76. Budushchaya voyna..., vol. 1, p. 206.

77. Ibid., p. 204. The wheeled shields also presented a good target for artillery fire.

78. Ibid., appendices to p. 200: 'mashiny dlya vozki passazhirov i tyazhesti...dlya perevozki gruzov po gruntovymi dorogami'.

79. Ibid., pp. 394-402.

80. Ibid., pp. 409-10(ranges); p. 402, 'strel'ba po nevidimoy dlya navodchikov tseli'.

81. Ibid., p. 402.

82. General Conclusions, French edition pp. 18-19.

83. Ibid., p. 18. See also Obshchye vyvody, pp. 58-59.

84. Fortress warfare is specifically addressed in Budushchaya voyna..., vol. 2, pp. 213-316; Obshchye vyvody..., p. 64. A glance at the Russian Inzhenerny zhurnal (Engineer Journal) during the years immediately before World War I, and a visit to the pre-World War I Russian coastal fortifications on the Gulf of Finland (the author visited the Finnish coast in 1980), confirms the view that the engineers envisaged permanent fortifications of increasing scale, complexity, technical ingenuity and expense.

85. E De-Opik, Kreposti i sovremennaya voyna (Fortresses and Contemporary Warfare) (I I Samonenko, Kiev, 1914) (cleared for publication 17 October). See especially 'Rol' kreposti v nyneshney Evropeyskoy voyne i vzglyad v budushcheye' ('The role of fortresses in the present European war and a look into the future'), pp. 45-52. On p. 50 De-Opik says that the illusion of 'monster fortresses' and 'super-fortresses' is not in fashion in the Russian Military Engineering School, and that the Russians had always inclined towards purely military fortifications, as opposed to the fortress cities of

western Europe. On Verdun, Alistair Horne, The Price of Glory. Verdun 1916, (Macmillan, London, 1975).

86. Bliokh, Budushchaya voyna..., Vol. 1, pp. 239-94, missions and impact on civil population, p. 239. On Budënniy's Deep raid, see Bellamy, The Evolution... pp. 149-56, effect on the 'deep rear', esp. p. 155.

87. Fëdor Gershel'man, 'Kavaleriya v sovremennykh voynakh' ('Cavalry in Contemporary Wars'), VSb 7/1898, pp. 76-121; 8/1898, pp. 424-441; 9/1898, pp. 104-131, this, 7/1898, p.77.

88. VES (1986), p. 394. A much fuller analysis of his career and work is in the Imperial Military Encyclopedia, VE (1911-15), Vol. 14, pp. 555-60.

89. See for example G A Leyer 'Znachenie kriticheskoy voyennoy istorii v izuchenii strategii i taktiki' ('The significance of Critical Military history in the Study of Strategy and Tactics'), VSb 5/1863, pp. 57-92; the extract from Strategiya: Taktika teatra voyennykh deystvii (Strategy: the Tactics of a Theatre of Military Operations) (1898) in Beskrovny, ed., Russkaya voyenno-teoreticheskaya..., pp. 306-338. In his introduction (pp. 21-22), Beskrovny notes that Leyer concentrated on tactics up to the war of 1877-78, and then began to write on strategy.

90. See the introduction to Beskrovny, 'Russkaya voyenno-teoreticheskaya..., p. 22.

91. VE, Vol. 14, p.557 cols. 1-2, 559 col. 2.

92. Bliokh, Wnioski ogólne..., bibliography; Gershel'man, 'Zadachi kavalerii...' VSb 7/1898 p. 77.

93. Gershel'man, 'Zadachi kavalerii...', 7/1898, pp. 77-78; Bliokh, General Conclusions, French edition, p. 42.

94. Gershel'man, 'Zadachi...', 7/1898 p. 79.

95. Ibid., pp. 79-80.

96. Ibid., p. 98.

97. Ibid., p. 80.

98. Ibid., p. 79.

99. Ibid., p. 111.

100. Ibid., p. 83.

101. Ibid., 9/1898, p. 126, citing Leyer, Strategiya...
102. Ibid., 7/1898, pp. 103-107.
103. Capt C R Day, 'Cavalry Raids. Their Value and How Made', Journal of the US Cavalry Association, September, 1912, pp. 227-38, this pp.235-8.
104. G A B Dewar and Lt Col J H Boraston, Sir Douglas Haig's Command, December 19, 1915 to November 11, 1918, (2 Vols., Constable, London, 1922), p. 44.
105. Martynov, 'Strategiya...' (see part 1, note 77 and Appendix B), p. 297 'khudozhestvennost' v operatsiyakh'
106. Petrov, 'Zadachi sovremennoy strategii...' VSB 5/1894, p. 49.
107. Ibid., p. 50.
108. Ibid., p. 53.
109. Ibid., p. 61.
110. Martynov, 'Neskol'ko slov...', VSB 8.1894, p. 236.
111. War and Common Sense. Reprinted from the Daily Mail, April 7, 8, 9, 1913. Wells wrote of the 'enormous defensive power of small, scientifically handled bodies of men. These huge conscript armies are made up not of masses of military muscle, but of a huge proportion of military fat'...Modern weapons and modern contrivance are continually decreasing the number of men who can be employed efficiently upon a length of front'(pp. 7-9); The War that will end War (Frank and Cecil Palmer, London, September 1914) included the need for men 'who are animated and individualised' and noted 'intelligent handling of weapons so elaborate and destructive that great masses of men in the field are an encumbrance rather than a power'. He also noted that Russia could only become powerful enough to overcome any highly civilised European country...by abandoning its obscurantist tendencies and liberalising upon the western European model'(pp. 66-67).
112. 'Uroki voyny', Russkiye vedomosti 1 January, 1915, p. 4 col. 3.
113. Mikhnevich, 'Poyavyatsya-li...' VSB 2/1898 pp. 260-64.
114. See Ageyev, 'Voyenno-teoreticheskiye vzglyady...'
115. Mikhnevich, 'Poyavyatsya-li...', p. 264.

116. V Kollontai, 'Ob odnorel'sovoy zheleznoy doroge sistemy "Monorail" i primeneni yeya k voyennym tselyam' ('On the single-rail Railway System "Monorail" and its Use for Military Purposes'), VSb 2/1900, pp. 362-66.
117. VES(1986), p. 465.
118. Cited by Gen Dr Baron Hugo von Freytag-Loringhoven, 'Wandlungen im operativen und taktischen Verfahren Napoleons verglichen mit denjenigen des Weltkriegs' ('Changes in Napoleon's Operational and Tactical Methods compared to those of the Great War'), Wissen und Wehr (Military thought), (Berlin) 1921, p. 339.
119. Mikhnevich, Osnovy strategii, p. 524
120. Ibid., p. 525.
121. Ibid., p. 522.
122. Lt Col Antoni Jasinski, 'Marsz-Manewr 1 Armii WP od Warszawy do Bydgoszczy i udział w przełamaniu wału pomorskiego 19.1-7.3.1945' ('The March-Manoeuvre of 1st Polish Army from Warsaw to Bydgoszcz and its Participation in the Breakthrough of the Pomeranian Wall'), Pt. 4, WPH 3/1957, pp. 3-52. The Soviet VES(1986), p. 428 describes 'marsh-manevr' as a historical term for forces arriving in a TVD (or on the battlefield) in an order favourable to the conduct of the ensuing battle. It says the term went out of use (in Russian) in the 1920s, but the Russian translation of the contents of the Polish journal cited uses the term as if readers were expected to understand it in 1957.
123. VES(1986), pp. 483, 813. The active discussion of military doctrine, though undefined as such (see part 2) is recognised in M A Gareyev, M V Frunze - Voyenny teoretik, pp.105-106, English translation pp. 95-96.
124. Published in Beskrovny, Russkaya voyenno-teoreticheskaya..., pp. 551-667.
125. Neznamov, Sovremennaya voyna... pp. 558-63.
126. General Sigismund von Schlichting (1829-1909) analysed the experience of the second half of the nineteenth century in Taktische und Strategische Grundsätze der Gegenwart (Principles of Modern Tactics and Strategy)(1897-99). Shaposhnikov later recalled that during this period Neznamov 'had been bringing us German views on operational art'. It is not clear whether this use of the term operational was retrospective and anachronistic. B. M. Shaposhnikov, Vospominaniya voyenno-

nauchnye Trudy (Memoirs: Military-Scientific Works), (Voyenizdat, Moscow, 1974), p. 144. See also part 1, note 133 on Neznamov's 'V zashchitu g. Shlikhtinga', MSb 3/1914 pp. 65-70 and Klado's 'Po povodu zashchitu...' See Neznamov 'Peremena napravleniya dvizheniya armii' ('Change in an Army's Direction of Movement'), Sovremennaya voyna in Beskrovny, Russkaya voyenno-teoreticheskaya..., pp. 594-97, Freytag-Loringhoven cited on p. 596. Freytag's biography in Deductions from the World war, (trans. from the German of 1917, introduction by 'J E M', Constable, London, 1918), p. iii.

127. VES(1986), p. 701.

128. Ibid., pp. 625-9, 629-35. Compare the British 1909 FSR (note 33), esp. pp. 48-49.

129. Neznamov, Sovremennaya voyna... in Beskrovny, p. 632, point 1.

130. Ibid., p. 632, point 2.

131. Ibid.

132. SVE, Vol. 6, p. 269. See Galaktionov, Tempy operatsii..., esp. pp. 344-49 for the 'perekhod k pozitsionnoy voyne' in the west; in the east, Kombrig N Yevseyev Sventsyanskiy proryv(1915 g.) (The Sventsyansk Breakthrough(1915), (Gosvoenizdat, Moscow, 1936), pp. 196-202, 'Stabilizatsiya fronta i perekhod k pozitsionnoy voyne'.

133. See Bellamy, The Evolution..., pp. 75-76.

134. See Fuller, On Future warfare, p. 78.

135. Neznamov, Sovremennaya voyna, in Beskrovny, Russkaya voyenno-teoreticheskaya... pp. 632-33.

136. General of Cavalry Friedrich von Bernhardi, Vom heutigen Krieg. Translated into English as On War of Today (London, 1912). Neznamov used the Russian translation, Vol. 2, p. 224, cited in Plan voyny in Beskrovny, Russkaya voyenno-teoreticheskaya, pp. 668-715, this p. 671.

137. Plan Voyny in Beskrovny, p. 671.

138. Ibid., p. 672, italics as kursiv in original

139. Ibid., bottom of page.

140. Ibid., p. 673, italics as original.

141. Ibid., pp. 673-75.
142. Ibid., pp. 675, 677, 678, 687.
143. Ageyev, 'Voyenno-teoreticheskiye...', p. 94, note 31.
144. Ibid., col. 1.
145. A Gulevich, 'Sozdaniye ekonomichskogo stroya Rossii i glavneyshikh yevropeyskikh gosudarstv s voyennoy tochki zreniya' ('Comparison of the Economic Structure of Russia with the most important European nations from a Military Viewpoint'), (St Petersburg, 1898), pp. 1-2, cited in Maj.Gen. S Kozlov, 'Voyennaya nauka i voyennye doktriny v pervoy mirovoy voyne' ('Military Art and Military Doctrines in World War I'), VIZh 11/1964, pp. 31-41, this p. 32.
146. English edition of the General Conclusions (Is War Now Impossible?), interview with Stead, p. xlix
147. Norman Angell The Great Illusion: a Study of the Relation of Military Power to National Advantage (Heinemann, London, 1913), first published as Europe's Optical Illusion, 1909). This went through many editions, being reissued between the World wars.
148. Schlieffen, Cannae (Russian edition of 1938), cited in Kozlov, 'Voyennaya nauka i voyennye doktriny...', p. 32.
149. Budushchaya voyna, Vol. 4, and the Atlas of Appendices, Prilozheniya k otdelu 'Obzor ekonomicheskikh zatrudneniy v Rossii v sluchaye voyny' (Appendices to the section 'Review of the Economic Difficulties in Russia in the Event of War' (Vol. 4, pp. 153-279).
150. A Gulevich Voyna i narodnoye khozyaystvo (1898), cited and ideas commented on in Svechin, Strategiya (2nd ed., 1927), p. 33, note 1 carried on from p. 32.
151. V I Gurko, Features and Figures of the Past, (Stanford and Oxford University Presses, 1939), pp. 415-16, details of Durnovo's appointments, p. 106.
152. D C B Lieven, Russia and the Origins of the First World War (Macmillan, London, 1987), p. 77.
153. Svechin, Strategiya, p. 49, 'Zapiska Durnovo', in the section 'Plan okhraneniya vnutrenney bezopasnosti', pp. 46-50.
154. V I Gurko, Features and Figures... p. 415.

155. Norman Stone, The Eastern Front 1914-1917, (Hodder and Stoughton, London, 1975); reforms due for completion by 1917, UK War Office, WO/33/712, Report on Certain aspects of the Military Situation in Russia, etc., March 1915.

156. Svechin, Strategiya, p. 49.

157. V I Gurko, pp. 415-16.

158. Maj Gen A S Milovidov, ed., Voyenno-teoretichskoye naslediyе V I Lenina i problemy sovremennoy voyny, (Voyenizdat, Moscow, 1987), p. 241. This chapter (9) 'Lenin's Military-Theoretical Views and Soviet Military science' was written by Col Gen D A Volkogonov. See also Col M Ivashchenko, Lt Col E Lemeshko, 'F Engel's o dialektike razvitiya sposobov vooruzhennoy bor'by' ('F Engels on the Dialectic of the Development of Methods of Armed Struggle'), KVS 14/1970, pp. 9-16; Lt Col A Dyrin, 'Bor'ba F Engel'sa protiv burzhuaznykh teorii voyny' ('F Engels' Struggle against Bourgeois Theories of war'), KVS 20/1970, pp. 17-23.

159. Milovidov, ed., Voyenno-teoreticheskoye naslediyе... p. 13. This chapter (1), by Col A I Dyrin.

160. 'The Siege of Sebastopol', New York Tribune, 15 November, 1854; in Aveling and Aveling, The Eastern Question... pp. 493-94. The editors said that 'careful investigation' had been necessary to determine Marx's authorship. The Tribune used many of his letters as anonymous leaders.

161. Engels to Sorge, London, 7 January 1888, cited in Karl Marx and Friedrich Engels Correspondence, ed. Torr, p. 455. Frequently quoted, for example, Cherednichenko, Voyenno-politicheskoye prognozirovaniye, KVS 20/1970, p. 24. The latter suggests the letter was actually written in 1887.

162. Engels to Danielson, London, 22 September, 1892, cited in Torr, p. 498.

163. Milovidov, ed., p. 18, ch. 1 by Col Dyrin.

164. Ibid.

165. Ibid., p. 19.

166. Lenin, The Revolutionary Army and the Revolutionary Government [27 June (10 July), 1905], (Progress Publishers, Moscow, 1980), p. 10.

167. Milovidov, ed., pp. 54-62, ch. 3 by E I Rybkin 'Leninskiye printsipy filosofsko-sotsiologicheskogo i Rybkin analiza voyn i sovremennost' ('Leninist Principles for philosophical-sociological Analysis of War and Modern

Times'). Army General S Ivanov, 'V I Lenin i Sovetskaya voyennaya strategiya' ('V I Lenin and Soviet Military Strategy'), KVS 2/1970, pp. 12-19 takes its examples of Lenin's practical contribution to strategy from 1918 onwards.

168. Ibid., pp. 62-63.

169. Ibid., p. 71.

170. Ibid.

171. Ibid., esp. pp. 242-43, ch. 9 by Col G Lukava, 'Voyenno-teoreticheskiye vzglyady V I Lenina i sovetskaya voyennaya nauka' ('The Military-Scientific Views of V I Lenin and Soviet Military Science').

172. V Gorev, ed., Voyna i voyennoye iskusstvo v svete istoricheskogo materializma. Sbornik statey D B Ryazanova, B I Goreva, R S Tsiffera, A A Svechina, i M N Tukhachevskogo, s prilozheniyem otryvkov i statey iz Marksa, Engel'sa i Lenina, (War and Military Art in the Light of Historical Materialism. A Collection of Articles...with an Appendix of passages from Marx, Engels and Lenin), (Gosizdat, Moscow and Leningrad, 1927). The work includes D B Ryazanov, 'Voyennoye delo i marksizm' ('Military affairs and Marxism'), pp. 5-23, A A Svechin, 'Evolutsiya strategicheskikh teorii' ('The Evolution of Strategic Theories'), pp. 54-102, M N Tukhachevskiy, 'K voprosu o sovremennoy strategii' ('On the Question of Contemporary strategy'), pp. 103-135, Appendix I, 'Marks i Engel's o voyne i voyennom iskusstve' ('Marx and Engels on War and Military Art'), pp. 136-76, and Appendix 2, 'Lenin o voyne v svyazi s zadachami revolyutsii (izbrannye stat'i)' ('Lenin on war in Connexion with the Tasks of the Revolution (Collected Articles)'), pp. 177-end.

173. Russia's War plans and actions at the beginning of World War I have been exhaustively analysed elsewhere, and to do so here would not be an original contribution to knowledge. See in particular Yuri Danilov Rossiia v mirovoy voyne (Russia in the World War), (Slovo, Berlin, 1924), also translated as La Russie dans la Guerre Mondiale (Payot, Paris, 1927), pp. 116-33 of the latter on war plans; Rostunov, Russkiy front v Pervoy Mirovoy voyne, ch. 2 on war planning, pp. 60-116. Allegation of impetuosity, Aleksandr Solzhenitsyn, August 1914, (Penguin, Harmondsworth, 1974), p. 124. A concise survey of the Imperial Russian General Staff's plans is in Ya Ya Alksnis 'Nachal'ny period voyny' ('The Opening Period of War'), ViR 9/1929, pp. 3-22. There were in all ten possible political scenarios envisaged at the outbreak of a war. These translated into plans as six 'partial

schedules'('chastnoye raspisaniye')(ChR), of which the first two had two variants, and two major war plans, one of which also had two variants:

ChR 1. War with Japan and China: Variant 1

Variant 2

ChR B. War with China

Variant 1

Variant 2

ChR 2. War in Turkestan

ChR 3. War in the Caucasus

ChR 4. A 'desant' [by enemy forces] on the Black Sea

ChR 5. Liquidation of a revolt in Finland.

War in the west against Germany and Austria-

Hungary: Plan G: Attack Germany, defend against Austria

Plan A: Attack Austria, defend against Germany

War in the West and in the Caucasus

In the event, the Russian General Staff had to modify the plans, attacking Germany and Austria simultaneously and, after Turkey's entry into the war in October 1914, becoming involved in war in the Caucasus as well (Alksnis, p. 10).

174. Stone, The Eastern Front... pp. 61-69; Ward Rutherford, The Ally. The Russian Army in World War I, (Gordon and Cremonesi, London, 1975), pp. 58-60.

175. See note 126.

176. See also note 132; Winston S Churchill, The World Crisis: The Eastern Front, (Thornton Butterworth, London, 1931), p. 83, opined that in the west, the armies were too big for the country, in the east, the country was too big for the armies.

177. Danilov, Rossiya v mirovoy voyne...pp. 98-99.

178. H G Wells, The War that will End War, p. 17, 'The peculiar military strength of Russia....lies in its vast resources of mounted men. A set invasion of Prussia may be a matter of many weeks, but the raiding possibilities in Eastern Germany are enormous...A Russian raid is far more likely to reach Berlin than a German to reach Paris'.

179. See Bellamy, The Evolution..., pp. 136-8.

180. See Shaposhnikov, '"Konnye massy" na flange armii...' VNiR 1/1921, pp. 95-126.

181. Mikhnevich, Strategiya, 1911, Vol. 1, pp. 40, 31.

182. Mikhnevich, 'Poyavyatsya-li...'(1898), p. 264, last sentence.

183. A Gutor, 'Kharakter sovremennoy voyny' ('The Character of Contemporary War', Voyennoye delo, 21/1918, pp. 3-6, this, pp. 3, col. 1 and 6, col. 1.
184. Details in SVE, Vol. 3, p. 79.
185. Gutor 'Kharakter...', p. 3, col. 1
186. Analysis of World War I, Neznamov 'Nekotorye vyvody iz opyta velikoy voyny' ('Certain Conclusions from the Experience of the Great War'), Voyennoye delo, Nos. 27, 29/1918; 4, 7-8, 21, 23-35/1919; 1-11, 13-15/1920. In particular, part 5 of the article. 'Artilleriyskiye voprosy' ('Artillery Questions'), VD, 20/1919, cols. 669-71; part II of the article, 'Voprosy strategii i taktiki' ('Questions of strategy and tactics'), 4/1920, cols. 112-16; part 13 'Obucheniiye mass i mladshikh nachal'nikov' ('Educating the masses and junior commanders'), 1/1920, cols. 7-9; part 14 'Podgotovka mass i mladshikh nachal'nikov' ('Training the masses...'), cols. 37-38. Lessons still unassimilated: Neznamov. Sovremennaya voyna. Chast' vtoraya (1921). Pp. 5-25 correspond almost exactly to the 1913 version of Plan Voyny in Beskrovny, pp. 669-84. On the Russo-Japanese and Balkan wars, see for example, pp. 13-14 of the 1921 version. Analysis of the First World War as the prototype of 'machine warfare' became more pronounced in the 1930s, as evinced by the extensive 1936 Khmelevskiy bibliography (see part 1), and, for example, S Budnevich 'Chemu nas uchit pervaya imperialisticheskaya voyna?' ('What can the First Imperialist war teach us?', VV 7/1934, pp. 18-26.
187. Neznamov, Sovremennaya voyna, p. 15. This is the same as the 1913 text (Beskrovny, p. 676), except for insertions on the fighting value of the Belgian army in 1914 and the value of reserve corps.
188. Neznamov, Sovremennaya voyna, p. 19; Beskrovny, p. 679. The reference to cavalry raids in the text was supplemented by a note referring to infantry in motor vehicles in 1913; in 1921 the author had added 'in future, perhaps, the most important technical equipment [may] also be carried through the air'.
189. SVE Vol. 6, pp. 285-87.
190. Civil War, SVE Vol. 3, pp. 7-22; explosion of future war analysis afterwards, see for example part 1, notes 81, 82.
191. Milovidov, ed., p. 243: 'marsh-manevry voysk na zheleznodorozhnykh napravleniyakh s ispol'zovaniyem bronepoyezdov, v pervye v Evropy vzaimodeystvuyushchikh s pekhotoy i konnitsey...'

192. S I Gusev, Uroki grazhdanskoy voyny (The Lessons of the Civil War), (2nd edn., Gosizdat, Moscow, 1922), p. 22-23.
193. Batorskiy, 'Neskol'ko mysley, vliyayushchikh na formy budushikh voyn', RiV 13/1921, p. 67.
194. Ibid., pp. 63-64; see also V K Golovkin, 'Bor'ba s tekhnikoy protivnika' ('The Struggle with Enemy technology'), VV 1/1922, pp. 9-11, and A Manikovskiy, 'Rol' artillerii v sovremennoy voyne (po opytu voyny 1914-1918 gg.)' ('The Role of Artillery in Contemporary War' (according to the Experience of the 1914-1918 war)'), Voyennaya Mysl' (Turkestan Front), Vol.1, part 1, 1920, pp. 343-61.
195. See Guy Hartcup, The War of Invention: Scientific Development, 1914-18, (Brassey's, London, 1988), John Terraine, White Heat. The New Warfare, 1914-18, (Sidgwick & Jackson, London, 1982), Shelford Bidwell and Dominick Graham, Fire-power: British Army Weapons and Theories of war, 1904-1945, pp. 102, 111-12. The American proponent of air power, Mitchell, even proposed the use of parachutes to deliver an airborne assault behind Metz in 1918: John Weeks, with Artwork by John Batchelor, Airborne Soldier, (Blandford, Poole, 1982), pp. 12-18.
196. 'USSR Foreign Affairs Chronology' in Encyclopedia Americana, Vol. 27 (New York, 1949), p. 291.
197. Gareyev, M V Frunze - Voyenny teoretik, p. 105: "doktrina, khotya i neformlennaya, v tsarskoy armii vse-taki byla..."
198. Zayonchkovski opposed a unified doctrine as inflexible in 'Yedinstvo voyennoy doktriny' ('The Unity of Military Doctrine'), Russkiy invalid No. 280, 1911; the others supported the idea: Kozlov, 'Voyennaya nauka i voyennye doktriny v pervoy mirovoy voyne', p. 39.
199. Gareyev, M V Frunze, p. 109, citing B Borisov in Voyennoye delo 8(72)/1920, p. 231.
200. Quotation from "Osnovy voyennoy doktriny". Tezisi A A Svechina ('The principles of Military Doctrine'. Theses of A A Svechin'), Voyennoye delo, 1920, cols. 38-39, this col. 38. On debate in general, see Gareyev, M V Frunze, pp. 108-10.
201. Frunze's career in Gareyev, M V Frunze..., pp. 9-86.
202. Yedinaya voyennaya doktrina i Krasnaya Armiya Article in Armiya i Revolyutsiya, 1 (July)/1921. See Gareyev, M V Frunze, pp. 73, 113.

203. Gareyev, M V Frunze... p. 113; Frunze, Sobraniye sochineniy (Collected Works), (Moscow-Leningrad, 1929), Vol. 1, p. 211.
204. Frunze, Izbrannye proizvedeniya (Selected Works), (Partizdat, Moscow, 1934), p. 552, editor's note; D Petrovskiy, 'Yedinaya voyennaya doktrina', ('A Unified Military Doctrine'), VV, 4/1921, pp. 2-3.
205. Petrovskiy, 'Yedinaya voyennaya doktrina..', p. 3, col. 1.
206. Kh Punga, Ugroza voyny i zapadnye sosedy, (Moscow-Leningrad, 1928), pp. 6, 15-29. Poland, Estonia, Finland, Latvia, Lithuania and Rumania could between them field 571,000 men against the Red Army's 562,000. In the light of recent events in eastern Europe and the Baltic States, this information is perhaps of renewed interest.
207. Gareyev, M V Frunze..., p. 115; Frunze, Sobraniye sochineniy, Vol. 1, p. 211.
208. Gareyev, M V Frunze, pp. 126-27; Frunze, Sobraniye sochineniy, vol. 1, p. 254.
209. Front i tyl v voyne budushchego (1924, published 1925); Gareyev, M V Frunze..., p. 73; Frunze, Sobraniye sochineniy, vol. 2, pp. 96-106.
210. This was a fashionable subject of concern at this time. See also for example Ya Dvinovitskiy 'Voyna pri pomoshchi bakterii' ('War with the Aid of Bacteria'), VV 4/1921, pp. 6-7.
211. Frunze, Front i tyl, pp. 96-106.
212. Ibid.
213. Collection of Laws and Edicts of the USSR Government, Vol. 1, No. 35, 6 June 1925, cited in Raymond, Soviet Preparations for Total War, p. 44.
214. I Bakanov, 'Frunze and USSR Defence', Bol'shevik, 19-20, October, 1940.
215. See V Akhov and another author whose name has been deleted, 'Reshayushchiy faktor' ('The decisive factor'), Krasnaya armiya (Red Army), Vol. 13, 1922, pp. 3-11. The English phrase is taken from Fuller, Machine warfare.
216. See part 1, notes 69, 157.
217. Bulgakov, Rokovye yaytsa, trans. Proffer, p. 127.

218. US Military intelligence Reports, Soviet Union 1919-41. Reel 10, frames not numbered, original document no. 66/2 [mobilisation], Mobilisation plan for Leningrad factories and works, 5 November 1928. Items 5, 10.
219. Intellectual life of Petrograd/Leningrad, V Shcherbin's critical essay in the 1962 Vologda edition, p. 442; quotation: Tolstoy, The Garin Death Ray (English translation, 1955), p. 100.
220. The Garin Death-Ray(1955), p. 100.
221. Ibid., p. 121. The device is illustrated on pp. 120-121: see also the 1939 Russian language edition, pp. 95-96, which omits the hole from which the narrowed beam issues.
222. Ibid., p. 122.
223. Ibid., p. 285.
224. Hugo von Freytag-Loringhoven, Generalship in the World War (trans. from the German of 1920), (US Army War College, Washington DC, 1934), p. 34.
225. Golubëv, M V Frunze o kharaktere budushchey voyny, p. 8. On Svechin, SVE Vol. 6, p. 264; Kokoshin and Lobov, 'Predvideniye...' Znamya 2/1990.
226. Svechin, Strategiya, 2nd ed., pp. 14-15.
227. SVE, vol. 6, p. 55.
228. Ibid., and Vol. 2, pp. 211-18 (Military Art)
229. Christopher Bellamy 'Red Star in the West: Marshal Tukhachevskiy and East-West Exchanges on the Art of War', RUSI, December 1987, pp. 63-73.
230. Kokoshin and Lobov, 'Predvideniye...', p. 174. Isserson (born 1898; date of death uncertain but probably in the late 1960s) had articles published in the mid-1960s: 'Razvitiye teorii sovetskogo operativnogo iskusstva v 30-e gody' ('The Development of Soviet Operational art in the 1930s'), VIZh 1/1965, pp. 36-46, 3/1965, pp. 48-61. See also Isserson 'Zapiski sovremennika o M N Tukhachevskom' ('Notes about M N Tukhachevskiy by a Contemporary'), VIZh 4/1963, pp. 64-78.
231. Kokoshin and Lobov, 'Predvideniye..', p. 171.
232. A A Svechin, 'Opasnye illyuzii', VMiR 2/1924, pp. 44-55, this p. 44.

233. Ibid., p. 48.
234. Ibid., pp. 54-55.
235. Ibid., p. 44.
236. Ibid., pp. 173, under 'Charakter budushchey voyny' (Poland first victim); 175 (Leningrad). Also Strategiya, esp. pp. 34-35.
237. Evolutsiya voyennogo iskusstva (The Evolution of Military Art) ((2 Vols., Moscow-Leningrad, 1927-28), cited in Kokoshin and Lobov 'Predvideniye', p. 178, 'every saving in time is a new plus for the defence'. Compare Clausewitz, On War, Bk. 6, ch. 1, Paret and Howard, p. 357.
238. Svechin, 'Opasnye illyuzii', pp. 51-2, 'gigantskaya metla', p. 52, main quotation p. 51, 'velikiye pozhirateli prostranstv'. See also Strategiya, 2nd. ed., p. 184, on the relation between space and defensive strength.
- 239., 'Deystvennost' strategicheskoy kontrataki...' Cited in Kokoshin and Lobov, 'Predvideniye', p. 178
240. Strategiya, p. 173.
241. Cited in Kokoshin and Lobov, p. 175. 'Pri "strategii izmora" mogut presledovat'sya stol' zhe reshitel'nye voyennye i politicheskiye tseli, kak i pri "strategii sokrusheniya"'.
242. Svechin, Strategiya, 2nd ed., p. 38, top.
243. Ibid., pp. 42-43. 'Parity': 'voyennoye ravnovesiye takzhe privodit k otkazu ot sokrushitel'nykh tseley'; 'my v budushchem, veroyatno, budem imet's preimushchestvenno dlitel'nye voyny'.
244. Ibid., pp. 46-47 ('Vedomstvo vnutrennykh del...'), 48 ('Aviatsiya, radio-telegraf...').
245. See the entries in John Keegan, ed. The Times Atlas of the Second World War (1989), pp. 172-3 on the Soviet war economy and pp. 28-29 on the British.
246. Protiv reaktsionnykh teoriy na nauchnom fronte (Against Reactionary Theories on the Scientific Front), (Gosizdat, Moscow, 1931). In the context of this study, esp. 'The Character of Future War according to Svechin', pp. 63-68.
247. Kokoshin and Lobov, 'Predvideniye', p. 170.

248. A Ageyev, 'Voyenny teoretik i voyenny istorik A A Svechin' ('Military Historian and Theoretician A A Svechin'), VIZh 8/1978, pp. 126-28, use until 1960s, p. 127.
249. Isserson, 'Zapiski sovremennika...', p. 66.
250. Polemostrategiya. Golubev, M V Frunze..., p. 8.
251. Tukhachevskiy, Voprosy sovremennoy strategii (Pamphlet, 'Voyenny vestnik' press, Moscow, 1926), in Izbrannye proizvedeniya, (2 Vols., Voenizdat, Moscow, 1964) Vol. 1 (1919-1927), pp. 244-61, this p. 252
252. Savushkin, 'Zarozhdeniye i razvitiye sovetskoy voyennoy doktriny', VIZh 2/1988 (see part 1, notes 6, 64-70), study analysed on pp. 21-22.
253. Maks Al'pert, Dmitry Debabov and Vladimir Mashatin, 'Magnitogorsk glazami trekh pokoleniy' ('Magnitogorsk through the Eyes of Three Generations'), Sovetskiy Soyuz (Soviet Union), 3/1990, pp. 19-23, this p. 21. The opening photograph shows a dramatic statue of a huge sword being handed to a Soviet soldier by Magnitogorsk.
254. Savushkin, 'Zarozhdeniye...', p. 22, citing TsGASA F. 33988, op. 2, d. 685, sheets(11.) 60-61. A list is a printer's sheet, equating to 16 pages.
255. Savushkin, 'Zarozhdeniye...', p. 22, citing TsGASA, ibid., d. 655 sheet 4.
256. Savushkin, 'Zarozhdeniye', p. 22, citing TsGASA, ibid., d. 688, sheets 50, 57, 59, 62, 72-3; F. 4, op. 2, d. 515 sheets 1-25; F. 7, op. 10, d. 791, sheets 1-13.
257. Verkhovskiy, 'Voyna zavtrashnego dnya', KZ 18 October 1925, p. 2.
258. V Triandafillov, Kharakter operatsii sovremennykh armii (Character of the Operations of Contemporary Armies), (3rd. ed., Gosvoenizdat, Moscow, 1936)(259 pp.), p.37, section 'The possible numerical Strength of Mobilized Armies', subsection 'Small motorized Units or Million-strong Armies'. Cites Svechin Strategiya 1st edn., p. 172.
259. Tukhachevskiy, Predisloviye k knige Dzh Fullera "Reformatsia voyny", Izbrannye proizvedeniya, Vol. 2, (1928-1937) pp. 147-56.

260. R Eydemān, 'K voprosu o kharaktere nachal'nogo perioda voyny' ('On the Question of the Character of the Opening Period of (a) War, ViR 3/1931, pp. 11-17, this p. 17. Emphasis in original.
261. OMSBON: Otdelny motostrel'kovy batal'on osobogo naznacheniya - Independent motor-rifle battalion of special designation, one of the ancestors of Spetsnaz.
262. See the case study 'Corps volant to OMG' in Bellamy, The Evolution of Modern Land Warfare, pp. 171, 276 note 159.
263. M N Tukhachevskiy, 'O kharaktere sovremennykh voyn v svete resheniy VI Kongressa Kominterna' (see part 2, note 47), stenographic record of paper to the Leningrad branch of Komakad, p. 3. At the end of his introduction to Fuller's Reformation of War (Izbrannye, Vol. 2, p. 156), he had stressed that 'the war of the imperialists against us will not savour of a little war'.
264. Speech to Komakad, 'O kharaktere...', p. 9.
265. Ibid., p. 14.
266. Ibid., p. 19.
267. Svechin, Strategiya, 2nd ed., p. 48.
268. Tukhachevskiy to komakad, 'O kharaktere...', p. 21.
269. Ibid., p. 22.
270. Ibid., p. 28.
271. Ibid.
272. Triandafillov, Kharakter operatsii, p. 39.
273. Ibid., p. 41. Emphasis in original.
274. Tukhachevskiy to komakad, p. 18; 'Infantry came out of the Imperialist war reconstructed, having gone over to automatic fire in place of rifle fire'. Also Triandafillov, Kharakter..., p. 17.
275. Triandafillov, Kharakter..., pp. 16-17. 'Amerikanskiye avtoruzh'ya Tompsona obr. 1923 g.'
276. British Intelligence reported that the Red Army was apparently bent on extracting 'the maximum firepower out of a given body of men by lavish allocation of mortars and automatic weapons'. WO 33/1828. Order of Battle of Military forces in USSR, 1945, p. III.

277. Triandafillov, Kharakter..., p. 29.
278. V F Kirey, Artilleriya ataki i oborony, (2nd ed., Voenizdat, Moscow, 1936), pp. 140-41. This was the Soviet edition of two secret pamphlets, written and published on the South-West Front in 1916.
279. Triandafillov, Kharakter..., p. 30.
280. Ibid., p. 31, 'tak nazyvayemaya mekhanicheskaya konnitsa'..
281. Ibid.
282. Ibid., p. 88.
283. Ibid.
284. 'Normy takticheskogo primeneniya khimicheskikh sredstv bor'by', Ibid., pp. 115-23, this p. 116.
285. Ibid., p. 119, quote p. 123.
286. Ibid., p. 95.
287. Ibid., p.60.
288. Ibid., pp. 128-38, 'Podkhod k polyu srazheniya', this p. 129.
289. Captain Jonathan M House, Towards Combined Arms Warfare. A Survey of Tactics, Doctrine and Organization in the 20th Century, (Combat Studies Institute, Fort Leavenworth, 1984), pp. 97-99.
290. Triandafillov, Kharakter..., p. 109.
291. M V Zakharov, General'ny shtab v predvoyennye gody (The General Staff in the Pre-War Years), (Voenizdat, Moscow, 1989)(written 1969, signed to press 29 December 1988, 65,000 copies), p. 89. The book was written in 1969 but 'is published only now, when the possibility of using facts, hitherto considered closed (Zakrytimi), appeared' (p.2.)
292. Tukhachevskiy, 'Novye voprosy voyny', VIZh 2/1962, pp. 62-77, this p. 71.
293. Ibid., pp. 67, 69. 'Kolesno-gusenichny tank'.
294. Ibid., p. 68.
295. Ibid., p. 69. Gun tanks against infantry were, he thought, 'islishnaya roskosh'-superfluous luxury.

296. Ibid.

297. Ibid., pp. 68, 69 'teleupravlyayemye tanki' (see also part 4).

298. Ibid., p. 69. Radio and remote control (telemekhanika) would guarantee 'osobuyu glubinu budushchego polya srazheniya'.

299. Ibid., p. 67 'letayushchiye tanki'.

300. A most thoughtful account of the evolution of the deep operation is in G Isserson, 'Razvitiye teorii sovetskogo operativnogo iskusstva v 30-e gody', part 1, VIZh 1/1965, pp. 36-46, esp. pp. 38-39.

301. SVE, Vol. 2(1976), p. 577.

302. Zakharov, General'ny shtab..., p. 89.

303. Isserson, 'Razvitiye teorii sovetskogo operativnogo iskusstva...', Part 1, VIZh 1/1965, p. 41. 'Kharakternym dlya razvitiya form operatsii budushchey voyny bylo ikh rasprostraneniye v glubinu'.

304. Ibid., pp. 41, 42., quote on the latter:

305. V Klimovskikh, 'Vstrechnoye srazheniye' ('The Meeting Engagement'), VM 8/1938, pp. 27-51.

306. Maj Gen P G Yegorov, 'Podvizhnost' ('Mobility'), VM 10/1940, pp. 77-85.

307. See Academy of Sciences of the USSR, Pobeda na reke Khlkhin-Gol (Victory on the Khalkhin-Gol), (Nauka, Moscow, 1981), p. 70.

308. Many contemporary sources comment on 'Russian inventiveness'. See The Illustrated London News, 6 April, 1940, pp. 446-7, which discusses 'Molotov's breadbasket' submunition bombs, recoilless guns, and 'a very good type of automatic pistol, absolutely free from jamming'. 'This inventiveness, it is worth pointing out, is not a new thing in Russia', the article reported. See also 'Tank sleds', Newsweek, 6 February 1940, p. 27. 'Then, in the early morning the Finns were astonished to see huge tanks pushing armored steel sleds, 6 feet wide and 12 feet long, across no-man's land, while smaller tanks laid smoke screens. When these contraptions had almost reached the Finnish front lines, Russian soldiers poured out...' An interesting perspective is Cyril Falls, 'The War with Nazi Germany: the Red Army in Finland', Illustrated London News 2 March, 1940, p. 270. Far from illustrating technological backwardness, the 'detachments were over-mechanised'. On

the Red Army's recoilless guns, Bellamy, Red God of War, pp. 113-15.

309. For example, 'Perspektivy voyny na zapadnom fronte' ('Perspectives of the War on the Western front'), KZ 27 February 1940, p. 2; Col M Nikol'skiy, 'Nekotorye vyvody iz deystviy aviatsii v Norvegii (v poryadke obsuzhdeniya)' ('Certain Conclusions from Air action in Norway (by Way of Discussion)'), KZ 16 May 1940, p. 2; Capt. N Kraynev, 'O nekotorykh vyvodakh iz norvezhskoy operatsii' ('On certain conclusions from the Norwegian Operation'), KZ 30 May 1940, p. 2; Col. I Ziberov, 'Vstrechny boy tankov v operativnoy glubine protivnika' ('Meeting Engagement of Tanks in the Enemy operational depth'), KZ, 27 December 1940, p. 3.

310. Anon. 'Artilleriya v sovremennoy voyne', ('Artillery in Contemporary War'), KZ 1 May 1940, p. 4.

311. Maj. P Kolomeytsev, 'Tanki v nastuplenii' ('Tanks in the Offensive'), KZ 28 May 1940, p. 2.

312. See the review, 'Obsuzhdeniye knigi general mayora V A Melikova "Strategicheskoye razvertivaniye". Na dispute v Tsentral'nom dome Krasnoy armii' ('Discussion of Major General V A Melikov's book Strategic Deployment. Disputation in the Main Centre of the Red Army'), KZ 3 December 1940, p. 3.

313. 'Programma povyshenoy khozyaystvennoy i oboronnoy moshchi SSSR' ('The Programme for increasing the Economic and Defensive Strength of the USSR'), KZ, 20 February 1941, p. 1.

314. S Vishnev, (Doctor of Economic Sciences) 'Neft' v sovremennoy voyne' ('Oil [including petroleum] in Contemporary Warfare'), KZ 27 December 1940, p. 4. Vishnev was a highly prescient commentator on military-industrial questions: see note 333.

315. S Vishnev, 'Proizvodstvennye rezervy vo vtoroy imperialisticheskoy voyne' ('Productive Reserves in the Second Imperialist War'), KZ, 16 May 1941, pp. 3, 4.

316. S Vishnev, A Shpirt, 'Voyna motorov i rezervov' (The War of Motors and Reserves'), Pravda, 23 March 1941, p. 5. Figures on the 'energovoorozhennost'' - 'energy armament' of the leading armies, cols. 1-2.

317. Ibid., col. 3.

318. I Semenov, 'Samolëtostroitel'naya programma SShA' ('The US Aircraft Building programme'), KZ, 14 February 1941, p. 4.

319. Army General G K Zhukov, 'God perestroiki', Pravda, 23 February 1941, p. 2, cols. 1 and 4. Article also appeared in KZ the same day.

320. Zakharov, General'ny shtab v predvoyennye gody ... p. 226.

321. Ibid., p. 227.

322. Ibid., p. 240. The article Maj. Gen. F Trukhin, 'Shtabnye voyennye igry' ('Headquarters War Games'), KZ 12 February 1941, p. 2, simply describes the mechanism for conducting such exercises.

323. Zakharov, pp. 240-41.

324. Ibid., p. 240.

325. Ibid., p. 247.

326. See Zakharov's comments, General'ny shtab... p. 245, and 'Vooruzhënnnye sily Sovetskogo naroda', Pravda, 23 February 1941, p. 1, cols 1-2. The breakthrough of 'a reinforced concrete fortified belt of this type demonstrated the supreme heroism of our armed forces our troops and commanders, showed the high level of our military technology and art'(col. 1).

327. Zakharov, pp. 248-49. The first game envisaged that the eastern (Soviet) side, 'Having held the enemy attack, on the frontier, would overcome the enemy forward positions and fortified belts. However on the new state frontier... Soviet forces could not meet such fortifications. Consequently, the situation envisaged for the game did not reflect reality, and somewhat overestimated our defensive capacity...' It is not clear whether he means that because there were no fortifications in the area, the game did not simulate the difficulties of overcoming them, or whether the game envisaged fortifications, whereas in fact none existed. Surely the fortifications being referred to would be German, or Soviet fortifications in German hands. How could their absence lead to the Red Army overestimating its 'defence capacity'? If one believed Viktor Suvorov, who put forward the theory that Stalin might have been planning to attack Germany using fortifications as a springboard, in his book Icebreaker (Hamish Hamilton, London, 1990), one might infer from Zakharov that the fortifications referred to were indeed intended as a springboard for attack (counter- or pre-emptive).

328. Zakharov, p. 249.

329. Ibid., pp. 249-50.

330. Ibid., p. 250. This was one of the distinctive features of the Soviet conduct of the war.
331. Vladimir Karpov, 'Marshaly Velikoy Otechestvennoy - Zhukov' ('Marshals of the Great Patriotic War - Zhukov'), KVS 5/1990, pp. 62-68, details pp. 67-68.
332. V D Danilov, 'Sovetskoye glavnoye komandovaniye v preddverii Velikoy otechestvennoy voyny' ('The Soviet High Command in the Run-up to the Great Patriotic War'), Novaya i noveyshaya istoriya (Recent and Most Recent history), 6/1988, pp. 3-20, this, pp. 17-18.
333. S Vishnev, 'Problemy perevooruzheniya inostrannykh armiy', ViR 4/1932, pp. 68-78.
334. Ibid. On pp. 72-3 he sets out the procedure whereby technological development and military requirements, including 'initiatives' are integrated in the process of peace-time rearmament, with the subsequent training of forces to use the new equipment. Wartime rearmament relies heavily on modification and a system of 'constructional variants' (pp. 75-77).
335. MSb 6/1886, p. 37, opening quotation to 'A.K.' (Anon.), Kreyser "Russkaya nadezhda", (S S Lyubavin, St Petersburg, 1887). Emphasis in original.
336. Donald W Mitchell, A History of Russian and Soviet Sea Power, (André Deutsch, London, 1974), pp. 165-67, 177-78.
337. Ibid., pp. 178-79. On British Russian rivalry in this period, Bellamy, 'British Views of Russia...' in Towle, ed., pp. 62-66.
338. Mitchell, pp. 185-86, SVE Vol. 8, pp. 81-82.
339. 'A.K.', Kreyser "Russkaya nadezhda", p. 1; translation The "Russia's Hope", p. 35.
340. Trans. The "Russia's Hope", p. 24.
341. Ibid., pp. 105 (portee across Persia), 118-19.
342. Ibid., preface, p. ii.
343. Ibid.
344. Fred T Jane, The Imperial Russian Navy, (New, revised edition, W Thacker, London, 1904), p. 609.
345. Ibid., p. 519.

346. A Belomor, Rokovaya voyna 18?? goda, p. 107.
347. Ibid., pp. 108-09.
348. Ibid. 'byla nazvana, posleduyushchimi istorikami i letopistsami, rokovoyu voynoyu.'
349. Ibid., p. 109.
350. Der Zukunftsrieg im Jahre 18...Vision eines russischen Patrioten von A Bjelomor. Einzig berechtigte Übersetzung von Carl Kupffer. Zweite Auflage, (Verlag von Heinrich Minden, Dresden und Leipzig, 1897).
351. Rokovaya voyna, p. 115.
352. Mitchell, pp. 197-98, 271-72.
353. Capt. 2nd Rank G R Parfenov, 'Po voprosam kreyserskoy voyny' ('On Questions of Cruiser War', MSb 2/1906, pp. 25-53; 3/1906, pp. 1-14; 4/1906, pp. 1-5; 5/1906, pp. 1-8; 6/1906, pp. 1-15; 7/1906, pp. 35-44; 8/1906, pp. 1-8; 9/1906, pp. 1-12; 10/1906, pp. 139-46; 11/1906, pp. 1-16.
354. Adm. A Melkhior, trans., 'Flot i oborona beregov' ('The Navy and Coastal Defence'), MSb 7/1909, pp. 61-74; 8/1909 pp. 81-89; 9/1909, pp. 57-72; 10/1909, pp. 43-62.
355. D Golov, 'Proby mekhanizmom Bronenostsa Dreadnought' ('Tests on the ironclad Dreadnought'), MSb 10/1906, pp. 139-46.
356. G Arturo Crocco, trans. from Rivista Marittima, 'Gidroplany' ('Seaplanes'), MSb 10/1909, pp. 81-102 and photographs on following page.
357. I Kortunov, trans., 'Rol' aerostatov i vozdushnikh motornykh korabley (dirizhabley) v Voenno-morskom dele', ('The Role of Balloons and Powered Airships (Dirigibles) in Naval Affairs') MSb 11/1909, pp. 29-56.
358. A de-L, trans. from United Services Magazine, October, 1910, 'Bronenosets budushchago' ('The Ironclad of the Future'), MSb 11/1910, pp. 81-85.
359. V de-L, trans. from Rivista Marittima, July-August, 1910, , 'Letatel'nyye apparaty v morskoy voyne' ('Flying Machines in Naval Warfare'), MSb, 11/1910, pp. 101-22.
360. A de-L, trans. from US Naval Institute Proceedings, 'Aeroplan dlya flota' ('The [heavier-than-air] aircraft for the Navy'), MSb 7/1911, pp. 73-86; 8/1911, pp. 83-111; 9/1911, pp. 99-109.

361. P Chechin and K Mikhailovskiy, 'Nastoyashcheye i budushcheye Yaponskago flota' ('The Present and Future of the Japanese Fleet'), MSb 4/1911, pp. 155-78

362. V Mikhlashevskiy, 'Vnezapnoye napadeniye cherez more - kak sposob nachala voyennykh deystviy', MSb 5/1911, pp. 179-87.

363. M Rimskiy-Korsakov, 'Zachem Rossii nuzhen flot', MSb, 2/1908, pp. 1-21; 3/1908, pp. 9-12.

364. N Klado, 'Etyudi po strategii', MSb, 1/1913, pp. 53-77; 2/1913, pp. 96-116; 5/1913, pp. 61-80; 6/1913, pp. 67-94; 8/1913, pp. 59-80; 11/1913, pp. 3-60; 12/1913, pp. 33-62; 1/1914, pp. 55-81; 2/1914, pp. 65-88; 4/1914, pp. 17-37; 5/1914, pp. 59-90; 10/1914, pp. 1-34; 11/1914, pp. 1-32. The 'studies' begin with the traditional Russian efforts to define strategy and its origins, its place among other military sciences, the value of history, drawing heavily on the work of Leyer (up to and including 6/1913).

365. Lt Kukel', 'Zachem Rossii nuzhen podvodny flot' ('Why does Russia need a Submarine Navy'), MSb 12/1908, pp. 1-6, this p. 1. On the general background on submarines, Mitchell, p.275-77.

366. Kukel', pp. 5-6.

367. Mitchell, p. 277, and Bernard M Kassell, 'Russia's Submarine Development 1850-1918', Journal of the American Society of Naval Engineers, Vol. 63, 1951, which is based on archives maintained in New York by former officers of the Imperial Russian Navy.

368. Mitchell, pp. 278-80; Anthony Pollen, The Great Gunnery Scandal, (Collins, London, 1980), pp. 200-01. The Russians ordered five complete sets of Pollen equipment. It is not known which ships they were installed in but in the second engagement with the German battle cruiser Goben on 5 May 1915, the Russian Black Sea Fleet scored 3 hits at 17,000 yards, the German cruiser none, suggesting that the revolutionary fire control system might be responsible.

369. Svechin, Strategiya, 2nd ed., 'Soobshcheniya' ('Communications'), pp. 189-200, 'Podkhod svoikh korabley' ('Movement of one's own ships'), pp. 197-99. Svechin discusses the conquest of South America and Napoleon's invasion of Egypt.

370. I Duplitskiy 'O roli morskikh sil po Svechinu' ('On the Role of Naval Forces according to Svechin'), in Komakad, Protiv reaktsionnykh teorii..., pp. 69-75. Not

enough emphasis on Red Commanders, p. 70: Genghis Khan analogy, p. 71. Duplitskiy finally admits on p. 72 that 'Na samom dele vo vsey "Strategii." vy ne naydete ni odnogo slova o morskikh silakh...'

371. Ibid., p. 72, citing Evolyutsiya voyennogo iskusstva, p. 227.

372. B B Zherve, 'Osnovy voyenno-morskoy strategii' ('Principles of Naval Strategy')(lectures from 1919-21), in Voprosy strategii i operativnogo iskusstva..., pp. 684-88. On p. 379, the editors note that Zherve paid insufficient attention to the 'role and significance of rapidly developing aviation and also experience of the widespread use of submarines in World War I'.

373. Duplitskiy, in Protiv reaktsionnykh... p. 74, citing Evolyutsiya voyennogo iskusstva, Vol. 2, pp. 535, 539.

374. Tukhachevskiy, Novye voprosy voyny (1931-32), VIZh 2/1962, p. 69.

375. Ibid., pp. 69-70.

376. Mitchell, pp. 370-71. A chapter by A P Aleksandrov, I S Isakov and V A Belli, 'Vyvody iz operatsii podvodnykh lodok po opytu mirovoy voyny' ('Conclusions from Employment of Submarines in the World War'), published in 1933, is reproduced in Voprosy strategii i operativnogo iskusstva..., pp. 709-16.

377. V Novitskiy, 'Voyennomorskiye sily v nachal'ny period voyny', ('Naval Forces in the Opening period of (a) War'), ViR, June-July 1935, pp. 46-55, this p. 46.

378. Ibid., p. 48, col. 2.

379. Ibid., p. 52, col. 2.

380. Ibid., p. 49, col. 1.

381. Ibid., p. 55, col. 1.

382. Mitchell, pp. 371-72. See also Gorshkov, The Sea Power of the State, pp. 135-36, and the editors of Voprosy strategii i operativnogo iskusstva..., p. 683, who mention the 'known influence' of the Spanish Civil War on 'the formation of naval theoretical views'..

383. P Smirnov's appointment, with a brief biography, is announced in MSb 1/1938, p. 9. This is followed by his article, 'Moguchiy morskoy i okeanskiy flot SSSR' ('A

powerful Sea- and Ocean-Going Fleet for the USSR'), pp. 10-17, this, p. 10.

384. Smirnov, 'Moguchiy morskoy...', p. 11.

385. Ibid., p. 16.

386. Mitchell, p. 374, citing Pravda, 3 February, 1938.

387. 'P.M.', 'Sovetskiy flag v inostrannykh vodakh' ('The Soviet Flag in Foreign Waters'), MSb 7/1937, pp. 49-51.

388. Mitchell, p. 366; Jurg Meister, The Soviet Navy, (2 Vols., Macdonald, London, 1972); (reprinted, 1 Vol., Macdonald and Jane's, London, 1977). This, Vol. 1, p. 44.

389. 'Voyenny flot blizhayshchego budushchego' ('The War Fleet of the Near Future'), MSb 10/1937, pp. 128-34, trans. from Rivista Marittima December 1936, this pp. 133-34.

390. P Kostylev, 'Orudiya krupnogo kalibra (istoricheskiy ocherk)' ('Large Calibre Guns (A Historical Sketch)'), MSb 7/1937, pp. 73-92. Summary of future developments, pp. 90-91.

391. United Kingdom, Admiralty, Monthly Intelligence Review (MIR) (Documents in possession of Naval Historical Branch, Empress State Building, Lillie Road, London), MIR No. 242, July, 1939, pp. 25-26.

392. Directorate of Naval Intelligence, Naval Aspects of the Possibility of War between the USSR and Great Britain, 15 November 1939.

393. Ibid. A 1940 Naval Plan Division paper (PD 08459/40), War with Russia, was produced but has not been located in the UK Public Record Office or the Ministry of Defence.

394. Meister, Vol. 1, pp. 72-76. The 'Chapayev' ('Frunze') class were laid down in 1940-41 but not completed until 1949-50.

395. Captain Richard Sharpe, ed., Jane's Fighting Ships 1990-91, (Jane's, Coulsdon, 1990), p. 69.

396. De-Opik, Kreposti v sovremennov voyne, final section, 'Rol' kreposti v nyneshnev Evropevskov voyne i vzglyad v budushcheye' ('The role of fortresses in the present European war and a look into the future'), p. 50.

397. Captain 1st Rank M Moskovenko, 'Sozdatel' krylatykh "Muromtsev"' ('Constructor of the Winged "Muromtsy" [plural]'), KZ, 4 November 1989, p. 4; Robin Cross, The Bombers. The Illustrated Story of Offensive Strategy and

Tactics in the Twentieth Century, (Bantam, London, 1987), p. 7; Sikorskiy, SVE, Vol. 7(1979), p. 343.

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400. Milovidov et al., Voyenno-teoreticheskoye nasledie V I Lenina..., p. 242.

401. Introduction to the section on the operational-strategic employment of aviation, Voprosy strategii i operativnogo iskusstva..., p. 622.

402. V L Teplinskiy, 'Rol' aviatsii v sovremennoy voyne' ('The role of aviation in contemporary warfare'), Pravda, 19 August 1940, reproduced in Voprosy strategii i operativnogo iskusstva..., pp. 673-76, this p. 673.

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414. Tukhachevskiy, 'Novye voprosy voyny', VIZh 2/1962, p. 65.
415. Nemecek, pp. 163-65
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465. HQ USAF Air Intelligence Reports, 100-13/9-100, dated 4 August, 1948(15 June report), p. 12.

466. 'Detali konstruktsii nemetskogo samolëta-snaryada V-1' ('Details of the construction of the German "aircraft-shell" V-1'), Tekhnika vozdushnogo flota (Air Force Technology), 1/1945, p. 38. For description of the V-1, TVF 10/1944.

467. Maj.-Gen. of Aviation E Tatarchenko 'Nekotorye problemy razvitiia vozdushnoy moshchi', ('Certain Problems of the Development of Air Power'), Vestnik vozdushnogo flota (Air Force Herald) (VVF), 5-6/1946, pp. 60-63, this, p. 61, col. 1.

468. Ibid.

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470. Tatarchenko, 'Nekotorye voprosy...', p. 61. col. 2

471. Ibid., p. 62.

472. Ibid., p. 63, col. 1.

473. Ibid.

474. Ibid.

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476. Ibid. It is often argued that the atomic bomb made possible the decisive role of air power as envisaged by Douhet.

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478. Public Record Office (PRO), Defe II 1251 (45), 24 October, 1945, Memorandum by Sir George Thompson, Effect of atomic bombs on warfare in the next few years, p. 4; PRO Defe II, 1252, Examination of the Possible Development of Methods and Methods of war, TWC(46)3 (Revised), 30 January, 1946, Part II, 'Effects on warfare', p. 8. The Soviet discussion recalls what now appear the bizarre developments of the 1940s, notably the American Convair B-36 six engined bomber, which entered service in 1949 designed to carry atomic bombs and drop them on the USSR.

479. 'An Absurd Situation', Vestnik, Soviet Magazine for Politics, Science and Culture, June 1990, pp. 58-64. This features a facsimile (pp. 61-63) and translation of Kapitsa's 18 December 1945 letter to Molotov, held in the Soviet Foreign policy Archives, ref. no. 13134/19.XII-45 g., with Molotov's notes in green pencil.

480. Ibid., p. 64, transcript of telephone conversation between Podtserob, Molotov's aide, and Kapitsa, 25 December, 1945.

481. Tatarchenko, p. 64, penultimate para; Cross, The Bombers..., pp. 192-93.

482. HQ USAF Air Intelligence Reports: 100-13/9-100 (4 August 1948), p. 10; 13/10-100 15 November, 1948, p. 12 13/11-100 9 February 1949, p. 16.

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486. Carver, Twentieth Century Warriors, p. 255; see the Introduction to Scott and Scott, ed. and trans. Sokolovskiy, Soviet Military Strategy.

487. 'Soviet Sets Up Rocket Command: Artillery Expert named as Chief', New York Times, 6 May, 1960, p.6.

488. See for example Col. V Vaneyev, 'Razvitiye tekhniki i voyennaya nauka' ('The Development of Technology and Military Science'), VM 3/1964, pp. 43-51. He notes a number of 'new and extraordinarily important military-scientific disciplines' including 'reliability' (nadezhnost') which might perhaps be translated as 'reliability and maintainability' in modern military jargon (p. 51). Col. A Sobolev, Col. V Shkarubskiy, 'Bor'ba s yadernymi sredstvami v operatsii i boyu' ('Struggle with nuclear assets in the operation and battle'), VM 2.1965, pp. 37-45. Nuclear weapons were 'the main, decisive force not only at the strategic and operational, but also the tactical, level' (p. 37). Col. A Tonkikh, 'Nekotorye tendentsii v razvitii raketno-artilleriyskikh protivotankovykh sredstv' ('Certain tendencies in the development of rocket and artillery anti-tank weapons'), VM 3/1965, pp. 41-51, addresses conventional anti-tank weapons but begins by putting them in context, as tanks 'are the main striking force of ground forces and the most able to exploit the results of nuclear strikes to the maximum extent...' G Mift'ev, V Vasin, M Srednev, 'K voprosu o roli ekonomiki v yadernoy voyne' ('On the Question of the role of Economics in Nuclear War'), VM 11/1965, pp. 27-36; Col. B Aleksandrov and Col. A Yur'ev, 'Vozdushno-kosmicheskaya Razvedka v vooruzhennoy bor'be' ('Aerospace reconnaissance in armed struggle'), VM 10/1965, pp. 31-42 highlights the fact that space was already considered a future theatre of war in the mid 1960s. Marshal V Sokolovskiy and Maj.-Gen. N

Cherednichenko, 'Voyennaya Strategiya i yeyë problemy' ('Military Strategy and its Problems'), VM, 10/1968 (original unavailable: US Government typewritten translation, pp. 32-43), discusses the definition of strategy and the use of computer models which, they believed, would 'raise its scientific level and provide for the successful resolution of many of its theoretical and practical problems in shorter periods of time than in the past'.

489. Bellamy, The Evolution, p. 107.

490. N Talenskiy, 'Protivoraketnye sistemy i problem razoruzheniya' ('ABM Systems and Problems of Disarmament'), Mezhdunarodnaya zhizn ('International Affairs') (MZh), 10/1964, pp. 28-34, esp. p. 33, bold type.

491. V Larionov '"Doktrina" voyenno-kosmicheskogo gospodstva', MZh 10/1964, pp. 42-51. Larionov also described space warfare along with land, sea and air in 'O vidakh i formakh voyennykh deystvii', VM 6/1965, p. 31.

492. Larionov, '"Doktrina"...', p. 46.

493. Ibid., p. 48.

494. John Hines interview with Tsygichko, 19 December 1989.

495. Ibid., and Hines interview with Larionov. 1954 exercise: Miksche, Atomic Weapons and Armies (1955), pp. 17-18. Both sides attacked the other's lines of communications, and the umpires declared that the war had ground to a halt.

496. M M Kir'yan, Revolyutsiya v voyennom dele, SVE, Vol. 8 (1979), p. 82. Kir'yan's bibliography is typically eccentric, and does not include the collection Problemy Revolyutsii v voyennom dele ... (Problems of the Revolution in Military affairs...), published in 1965, which is a key source on the subject.

497. Zakharov, General'ny shtab... p. 292.